

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Interesting Relics for the Chicago Railway Exposition.

It is stated that the Baltimore and Ohio Railway Co. will send to the Chicago Railway Exposition the first successful locomotive engine built for their road. This locomotive is the well-known "Arabian," No. 1. It is not, as is generally supposed, either the first engine built by the company or the first engine that pulled a train on a curved road. It was built at the company's shops, under the supervision of its designer, Mr. P. Davis, and went into service in June, 1834. It has been carefully guarded and repaired, and with very little difference is stated to be precisely the same engine that it was 49 years ago. It is claimed to be the oldest effective locomotive in the United States, and perhaps in the world. The engine has a vertical cylinder and a walking-beam. There are four driving-wheels, each 36 inches in diameter, or about one-half the size of the drivers used on modern passenger locomotives. The weight of the "Arabian" is 13 tons, about one-third that of the modern locomotive. The engine was originally provided with fans connected with the exhaust, but these were broken and no attempt has been made to restore them, and with this exception it is the same engine as when first put upon the road. For a great number of years it served as a passenger engine drawing trains on both the Washington branch and the main line, and, so far as could be learned, it had never met with an accident, jumped a rail or run off the track, with one exception. This exception was a notable one. Before the engine was finished the designer, Mr. Davis, promised the workmen engaged in the shops, some 300 in number, to take them and their families on a train drawn by the "Arabian" as far as it went, and then go to Washington. The Washington branch was then open nearly to Bladensburg. While making the trip and when 13½ miles from Baltimore the engine ran off the track and rolled on its side. With the exception of Mr. Davis, who was killed, nobody on the train was hurt. Nobody could tell why the "Arabian" ran off the track. There was no evidence ever shown, although an extensive investigation was made, that any cause existed to throw it off. The engine will be taken to Chicago by Mr. Thomas Galloway, and visitors to the Exposition will thus have an opportunity of seeing the oldest effective locomotive engine in the world, run by the oldest living railway engineer, an incident in railway history which is not without interest.

Another old locomotive to be exhibited at the exposition is the "Samson," which recently passed through Toronto on its way to Chicago. The "Samson" was built in August, 1838, by Timothy Hackworth, of New Sheldon, Durham, England, and brought to America in the same year, and has been used ever since in the Albion coal mine, near Stellarton, N. S. The locomotive is a standard gauge inverted direct-acting engine, with 4-foot drivers. As in all locomotives of this class, her cylinders are perpendicular, and are placed at the back of the engine on each side of the engineer. The piston-rods act on the hind wheels, which, in turn, are connected with those in the middle and in front. The furnace door is in front, and the tender runs ahead, giving the whole machine a very singular appearance. The passenger car which accompanies this relic is also a curiosity, being one of the old-fashioned coaches, capable of comfortably holding four persons, two on each seat. The doors are at the sides, as is still the case on many English railways, and a step runs along each side the whole length of the coach.

The Oldest Alpine Tunnel. — The heading driven through Mont Viso at the instigation of Louis II, Margrave of Saluzzo, and constructed from 1472 to 1480, may probably be looked upon as the oldest Alpine tunnel in existence. The difficult passes over Mont Genèvre and Mont Cenis, which before that time were the only means of communication between Northern Italy and Dauphiné, but which entailed a very heavy expense upon the inhabitants of Saluzzo, and were, besides, frequently rendered impassable on account of the many little border wars, suggested to the Margrave the plan of making a direct road through Mont Viso between the valley of the Po and that of Queyras, opening on to the Durance. The negotiations entered into with the estates of Dauphiné and Louis XI, King of France, led in 1477 to a satisfactory arrangement, and the tunnel was completed a few years later by Martino d'Albano and Baltasar d'Alpasio, at a total cost, including the paths leading to it, of 12,000 florins. The tunnel has a height of 6½ feet, and an average width of 8 feet, and at the present time a length of only about 250 feet; but it is stated that, in consequence of frequent landslips, the openings have gradually receded, and the tunnel, when first constructed, may have had double that length. The geological structure of the mountain is similar to that of Mont Cenis, so that frequent eruptions made repeated clearances necessary. During times of war, the tunnel has been frequently blocked, and even walled up, but it was made perfectly passable again by orders of Napoleon I.

New Rail Cambering Arrangement.

The Lackawanna Iron and Coal Co., of Scranton, Pa., have lately put into operation a new rail-cambering arrangement, the invention of Mr. W. K. Seaman, who is connected with the drafting department of the company. The purpose of the improvement is to do away with the objectionable feature

cured a series of "idler" guide rolls, B B, &c., which guide the rail to the first pair of driven or "grip" rolls C, which forward it thence through the guide rolls B' to the second pair of grip rolls C', thence through the guide rolls B' to a third pair of grip rolls, and so on successively till it reaches the cambering or bending machine E, Fig. 1, which delivers it on the hot-bed with the re-

two cambering machines, for the following reasons:

1. It is thereby rendered possible to transmit the rail across the first bed and to the second cambering machine while it is still straight, the bending roll of the first cambering machine being invariably thrown back, so that this machine acts simply as a pair of grip rolls when the second cambering ma-

chine; the drum shaft I through the reversing friction clutch O in either direction at will, and the grip rolls, through the reversing friction clutch L in either direction at will.

With the drum shaft I we shall have little further to do; its function is simply to slide the rail over the surface of the hot-bed in either direction from the center, by means of operating traverse buggies running on top of the rails of the bed. These buggies are drawn back and forth by endless wire ropes passing over sheaves at either end of the bed and around the drums T T at the center several times in the ordinary way. By means of crab couplings on the drum shaft, either pair of drums can be operated at will, while the other pair stands still, these couplings being reversed only, of course, when one bed is filled with rails and the other is to be used.

By means of the grip rolls the rail is adjusted to and held in the proper position for having its ends cut off by the hot saws D D, Figs. 1 and 3. These saws are suspended in rigidly trussed swings, and are fed across the rail by a hydraulic cylinder fixed on the central countershaft stand. The swings and feeding connections are of ample proportions, and are so designed as to insure steadiness and freedom from vibration to the saw mandrel. Both the friction reversing clutches O and L and the hydraulic cylinder feeding the saws are operated by hand levers, Y, Y', Y'', conveniently arranged upon the elevated working pulpit V, Fig. 1. The operator faces the rail as it lies before him; looks toward his right, whence he receives it from the train; in front, when he adjusts it for sawing, and cuts off the ends; and toward his left, when he traverses it across the hot-bed, after it has passed through the cambering machine.

Having thus described the general arrangement, the details, beginning with the "grip" or forwarding rolls, will next be considered. But one roll of each pair of grips is driven; the other roll runs free on its axle. The driven roll runs in fixed bearings, top and bottom, and receives its motion directly from the line shaft J, situated vertically below it, through a pair of miter gears. The loose roll is capable of all the required adjustment for different rail sections in the following manner: The axle on which it turns is supported top and bottom by the frame of the machine; these two supports have a common axis, while that portion of the shaft around which the roll revolves is eccentric with them. Now, to vary the distance between the two rolls it is only necessary to turn the roll-shaft, in its supports, through a portion of a revolution, and clamp the shaft firmly in the desired position by a nut. A square end is provided on the shaft, above the nut, whereby the shaft is turned in its supports and held while being clamped.

The rail enters the machine as indicated by the arrow, its weight being carried by the web on the rolls w, Fig. 3, throughout the entire arrangement. These rolls are so placed that for all common sections of rails their position does not require adjustment of any kind. It will be seen that the shaft J, inaccessible, apparently, at first sight, can be removed without disturbing the sole-plate, which is firmly bolted and sulphured to the foundation. Without calling special attention to this point for each machine, it may be here stated that this feature has been embodied in all the details whose positions are over the shaft J. Further, the bearings of the shaft J' are all in accessible positions for inspection and oiling; this position of these shafts was selected because it did away with so much mechanism necessary in existing arrangements.

We shall next consider the two cambering machines, the position of one of them being indicated at E, Fig. 1, the second being situated on the further end of the shaft J', between the first and second hot-bed, the latter not shown. Figs. 6, 4 and 7 (plan and two sectional elevations) show the details of these machines. They are simply combinations in one machine of two pairs of grip rolls, b, d and b', d', with a bending roll, j. One roll, b, b', of each pair of grip rolls is driven directly, through miter-gears, from the shaft J'; these rolls run in fixed bearings, are in no way adjustable, and are the only driven rolls in the entire machine. The rolls d, d', are adjustable by the eccentric arrangement before described. The roll j has precisely a similar means of adjustment, but it is retained in the desired position by the lever n, running over the slotted segment p and clamped by the nut o. This segment can be graduated (from practice) for the various rail sections, and the adjustment of the lever n gives the required variation in camber in a most simple manner. The ends of the rail (where sharp upward bends are liable to exist as it is delivered from the train) having been invariably sawn off before it reaches the cambering machine, it is admissible to put the upper bearings of the rolls of this machine in a continuous frame, I, above the rolls; by this means a much more rigid construction is obtained than is possible where both bearings are below the rolls; also, by placing the upper bearings of the shafts above the work, they are protected from scale—two important features. The lower bearings and miter gears are completely protected from the scale by the

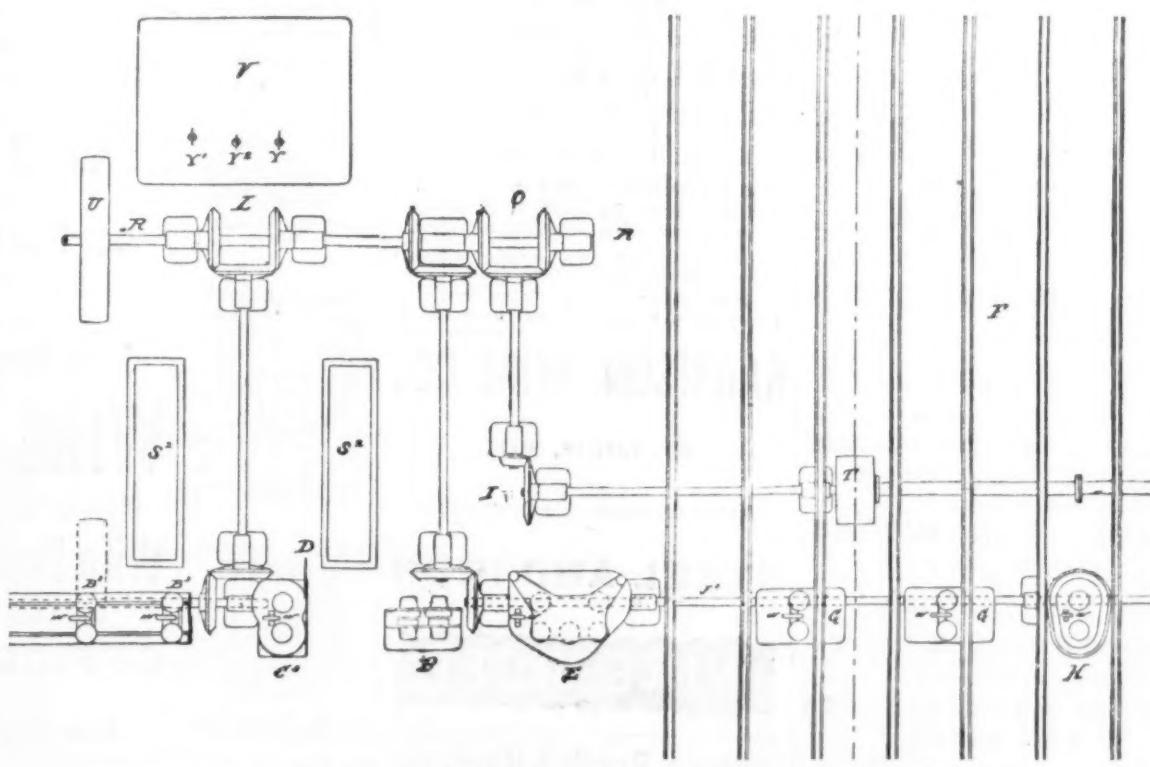


Fig. 1.—Last Set of Grip Rolls, Driving Mechanism and Portion of First Hot-Bed.

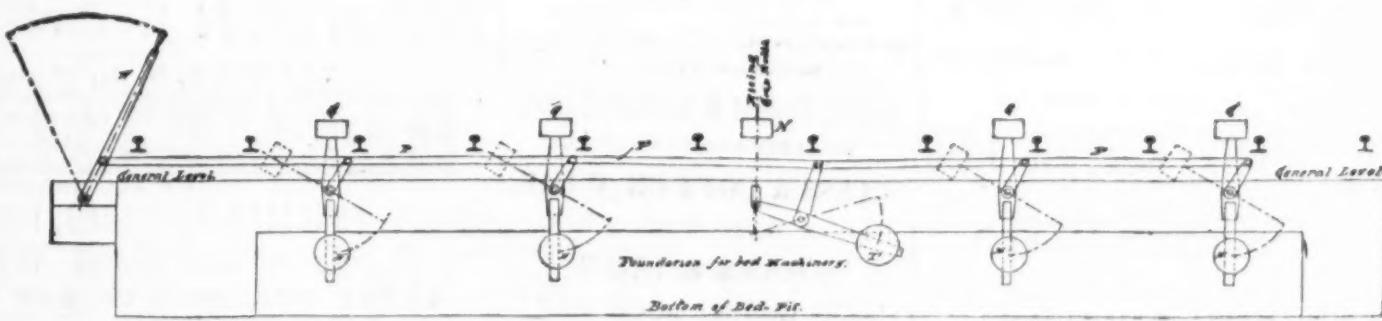


Fig. 2.—Hot-Bed No. 1.

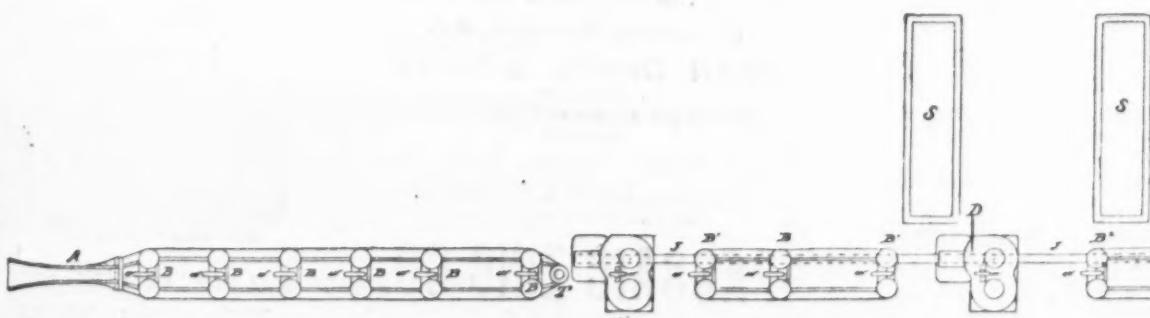


Fig. 3.—General Plan of Switch and Adjacent Grip Rolls.

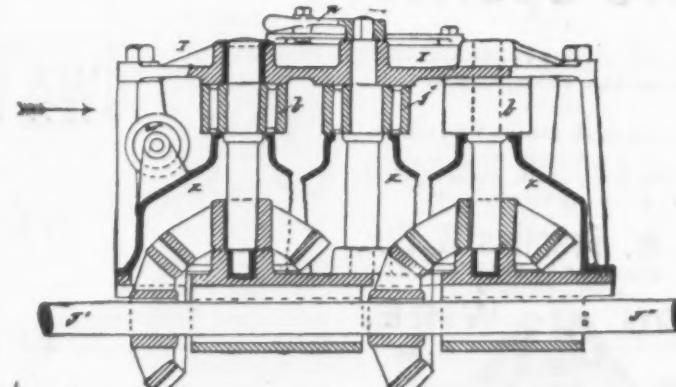


Fig. 4.—Section Through Rolls of Cambering Machine.

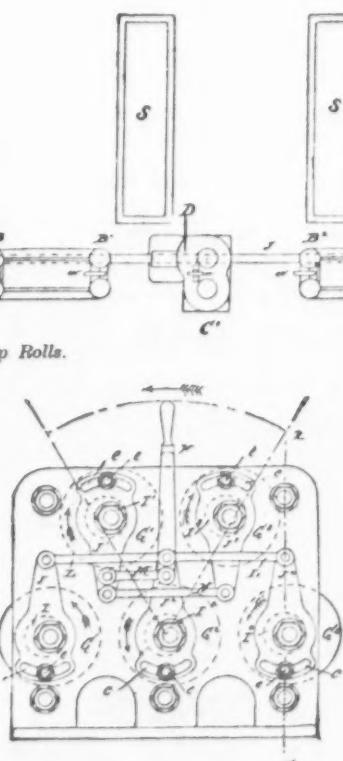


Fig. 5.—Side Elevation of Hot-Rail Straightening Machine.

RAIL CAMBERING ARRANGEMENT, DESIGNED BY WILLIAM K. SEAMAN.

of cold-straightening steel rails. The invention has been the subject of a paper read by Mr. Seaman before the American Society of Mechanical Engineers, of which we avail ourselves in the description of the plant, which is now in successful operation.

In Fig. 3, A designates the mouth of the switch, which receives the rail from the finishing rolls, the switch being made to swing on the pivot T, so that its mouth can be adjusted to receive the rail from either of the finishing passes. On the switch are se-

quired curve. It will be seen that a second hot-bed is provided, and that between the rails of the first bed is placed the necessary machinery for transmitting the rail across this bed and to the second cambering machine and its hot-bed. Two hot-beds are necessary, otherwise the capacity of the apparatus for properly cooling the rails would not equal that of the train for rolling them, and the latter machine would necessarily be restricted in output.

It is thought highly advantageous to have

chine is being used and the second bed is being filled with rails.

2. By the use of two cambering machines it is rendered possible to continue work at the rail train in case of the derangement from any cause of either cambering machine. R R, Fig. 1, indicates the main or engine shaft driving the entire arrangement; the saw countershaft (not shown) constantly in one direction by belting from the pulley U; the cambering machines and grip rolls H by plain miter-gears, constantly in one direction;

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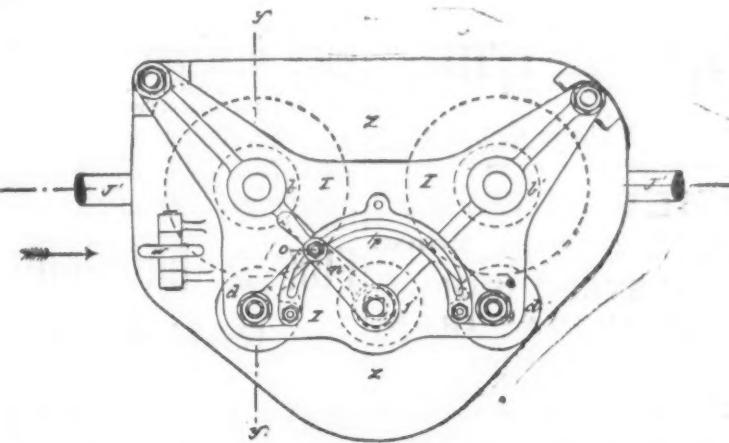
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shrouding casting *e*, which delivers it in all directions away from the rolls.

The essential details as far as the first hotbed have now been described; the machinery in this bed, and for the purpose of transmitting the rail over it to the second cambering machine, will next be considered. The requirements of this mechanism are twofold; first, while the first bed is being used, it must entirely disappear from above the surface of this bed in order to allow of the free transverse motion of the hot rails toward the ends and from the center of the bed, where they are delivered by the cambering machine; second, when the second bed is being used, the mechanism must appear above the surface of the first bed in order to grasp and forward the rail across said bed to the second cambering machine and its bed. This machine consists simply of one pair of grip rolls, *H*, Fig. 1, and four sets of guide rolls, *G*, similar to those described, with the addition of means for raising and lowering them above or below the level of the bed,

moved upward, while the rolls *G* and *G'* are moved downward. By pushing the lever in the opposite direction, the motion of adjustment is, of course, reversed. The adjustment of all the rolls toward the axis of the rail is necessary, from the fact that the web of all sections of rails runs on the constant level of the carrying rolls *w w*, &c., Fig. 3, and this level must necessarily be maintained through the straightening machine.

In the arms *I*, *I'*, &c., are formed segmental slots, *c*, through which screw studs provided with nuts, *e*, extend from the frame of the machine. When the rolls *G*—*G'* have been adjusted, the nuts *e* are screwed down, locking them in the desired position, and thereby retaining the roll centers as required for any given section of rail. Also screwing down the nuts *e* relieves the arms *I*, *I'*, &c., and their several connecting links, of all strain, their function being simply to retain the eccentric bushes in their relative positions when the adjustment of the rolls is being made.



Rail Cambering Arrangement, Designed by William K. Seaman.—Fig. 6.—Plan of Cambering Machine.

according as to which bed is being used.

The action of this pair of grip rolls is essentially the same as that of the others; its construction is, however, necessarily different, to allow for the required vertical motion, which is provided for as follows: The lower bearing of the driven roll-shaft is fixed in the plate of the machine. The upper bearing of this shaft and the two bearings of the adjustable roll-shaft are carried in a single casting, which is capable of vertical motion, carrying the rolls with it, on four fixed guide-posts, in a manner similar to that employed for the platen of an ordinary hydraulic or screw press. The driven roll-shaft obtains its motion by means of a "splined" bush, to which the driven gear is keyed, through which the shaft can freely move in the direction of its axis, but from which, by means of a "feather" key, it obtains its rotary motion. The casting carrying the three bearings, the rolls and attendant parts is supported through links at the ends of two levers, which are keyed to the horizontal rock-shaft, running in fixed bearings on the sole-plate. On the opposite ends of these levers are the coun-

There are some very good features also in Mr. Seaman's construction of the hot-bed. The bed is made unusually high, in order to allow a free circulation of the air underneath, thereby obtaining an approximately equal cooling effect upward and downward. The columns are attached to the bed-plates by keys and pins, all of which are fitted into cored holes, making a comparatively inexpensive construction.

The rail-straightening machine possessed features which, it would seem, might with perfect propriety and great advantage be adopted for cold straightening. The advantages claimed for the entire arrangement are:

1. The maintenance of perfect parallelism between the axis of the rolls in all conditions of adjustment. 2. Dispensing with the necessity of different sets of change rolls for the various rail sections. 3. The means of obtaining a variable camber for different rail sections with but one simple adjustment of the lever of the bending roll of the cambering machine over its graduated arc. 4. In the cambering machine, by the use of the continuous upper frame above the

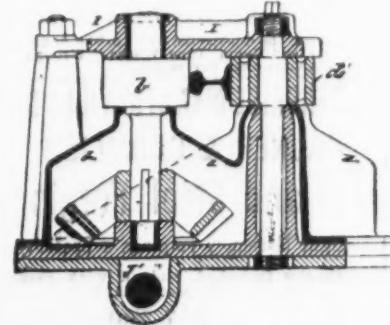
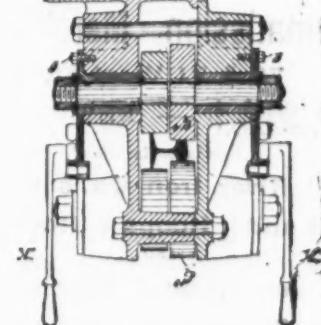


Fig. 7.—Section on Line y y of Fig. 3.



rolls, a much more rigid construction than has been hitherto obtained. 5. The efficient provision for the exclusion of scale from bearings and gearing. 6. A rigidly straight guide for the moving rail, by making one of each pair of rolls run about a fixed center, while the opposite adjusts toward it. 7. The minimum of necessary labor for operating. 8. The minimum of necessary driving gearing and shafting. 9. The provision for taking vertical kinks out of the rail by the use of the straightening machine. 10. The provision of a hot-bed that will remain level under the variable temperatures to which it is subject.

The plan of numbering the Italian laborers on the West Shore road is said to have been found highly successful. Finding it impossible to keep track of the men by their names, the contractors concluded to number them. The number of each Italian is painted in plain figures on the seat of his pantaloons. Before beginning work in the morning and at noon and again at night, the men are formed in line, and the foreman passes in the rear of them and takes down each number, in order to ascertain who is present, as well as who is absent. The plan is beneficial in two ways—the men are easily recognized, and they are also kept from sitting down too much for fear of rubbing out the figures on the seats of their pantaloons.

At the instance of the bulk of the iron-workers of the North of England, the Board of Arbitration issued a decree some time ago restricting for six months the output of manufactured iron by one shift out of eleven per week. One condition of this concession on the part of the employers was that all works in the North should partake in it, or the regulation would become void. According to present reports, however, the West Marsh and Britannia Works, of Middlesborough, were recently lit up for work, the mill hands having offered their employers to break the rule if paid 2½ per cent. advance in wages. The offer was accepted, and it is now thought that the action taken will lead to serious disputes in the trade.

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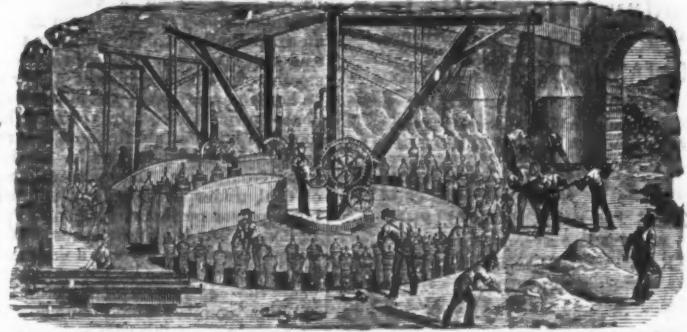
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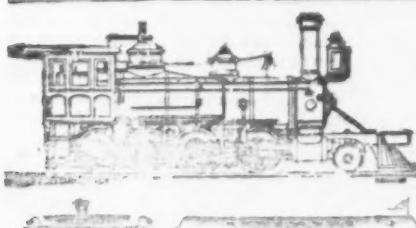
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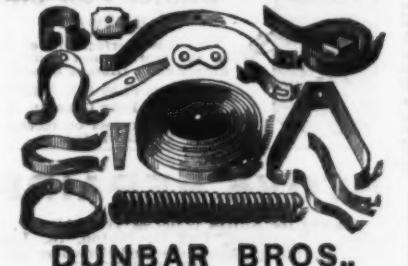
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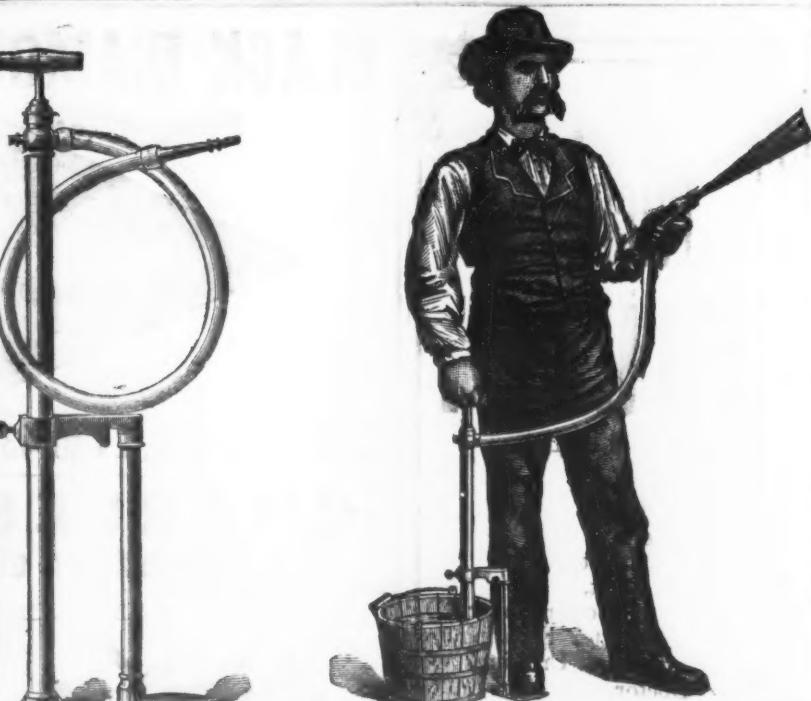


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essentially in condensing a known weight of steam in a known weight of water, say 200 pounds, and calculating the amount of entrained water from the temperatures. Some very elaborate and expensive experiments have been made on this point. In good boilers, with abundant water surface and steam space, the priming does not exceed 3 per cent.; but in badly constructed boilers, with insufficient steam space and water surface, it may rise to 10 or 15 per cent.

Before a test is begun the boiler and setting should be carefully inspected and cleaned, and all leaks and drafts of air should be stopped. The boilers and settings should be warmed up, and then the fires drawn and the grates cleaned. A fresh fire is then immediately kindled with weighed wood and coal, and the test begun. It has been found that a deposit of 1-16th inch of scale on the heating surfaces caused a loss of 13 per cent. of the fuel; $\frac{1}{4}$ inch caused a loss of 38 per cent., and $\frac{1}{2}$ inch caused a loss of 60 per cent.

The report of an evaporative test should contain the following data:

1. Date of trial.
2. Description of boiler, giving grate area and heating surface.
3. Weight of water.
4. Average steam pressure.
5. Average temperature of feed-water.
6. Total pounds of coal burned.
7. Percentage of ash and moisture in coal.
8. Percentage of combustible in coal.
9. Pounds of coal consumed per square foot of grate.
10. Pounds of water evaporated—total.
11. Pounds of water evaporated per square foot of heating surface.
12. Pounds of water evaporated per pound of coal—actual conditions.
13. Pounds of water evaporated per pound of coal from and at 212° .
14. Pounds of water evaporated per pound of combustible from and at 212° .
15. Rated horse-power of boiler.
16. Horse-power developed.
17. Horse-power above or below rated.
18. Temperature of flue gases, by pyrometer.
19. Force of draft in chimney, in inches of water.

The latter can be obtained by connecting a U-tube with the chimney. Water in the U-tube will rise in the leg connected to the flue, and the difference of level of the water in the two legs of the U gives the data required.

In the discussion which followed, one gentleman reported some tests he had made, when Mr. Kent created considerable merriment by calling his attention to the fact that he had evaporated more than the quantity of water theoretically possible. One member, a prominent steel manufacturer, declared that he was in favor of the plain cylinder boiler as the most reliable, and of the two-flued as next. Another member declared that the two-flued boiler was the only one which could give satisfaction under the very irregular and constantly varying work of a rolling mill. Mr. Kent denied the assertion, declaring that any boiler of proper size, and having sufficient steam room and water surface, could do the work.

LATEST LEGAL DECISIONS.

ATTACHMENT—NOTICE OF ASSIGNMENT OF CLAIM—STATE LAWS CONFLICTING.

A, a creditor living in Illinois, assigned to B, his creditor, who lived in Louisiana, a debt due him by C, who did business in Minnesota. No notice was given to C of this assignment of the debt. By the laws of Illinois, such an assignment was not valid against attaching creditors unless notice or "intimation" was given to the debtor; but it was valid without notice in Minnesota, where the debtor resided. Without notice, D, of Canada, a creditor of A, sued him in Minnesota, and attached the debt in C's hands. In the suit—Lewis vs. Lawrence—the Louisiana creditor, B, was admitted as a party, and the assignment to him was upheld. An appeal was taken to the Supreme Court of Minnesota and the judgment was affirmed. Judge Mitchell, in the opinion, said: "The fiction of law that the domicile of the owner draws to it his personal property, wherever situated, must always yield to the law in reference to the attachment of the property of non-resident debtors, because such laws necessarily assume that the property has a *situs* distinct from the owner's domicile. Attachment or garnishee proceedings are against the property attached—not against the person. They are instituted upon the theory that the thing sought to be reached is situated within the State. It is that alone which gives the court jurisdiction. The question here between the creditors goes to the remedy, and must be decided in favor of the Louisiana creditor."

PROMISSORY NOTE—PAYMENT—INTENTION.

A note was deposited in bank B for collection, and it was sent to bank C, at the residence of the maker, to be collected. F, the note teller of bank C, protested the note for non-payment, but supposed that he had failed to make the protest in time. He paid the amount of the note to his own bank, which then remitted to bank B, and the note was then indorsed to F, who brought suit on it against a guarantor. In this case—Fogarty vs. Wilson—the plaintiff recovered, and, on appeal, the Supreme Court of Minnesota affirmed the judgment. The defendant took the ground that the note had been paid. The Chief Justice (Gilligan), in the opinion, said: "The payment of the money by the plaintiff to his bank was not the payment of the note unless it was made with that intention, and there was no relation between the plaintiff and those liable on the note to give the latter any right to have the payment appropriated to their benefit, contrary to the intention of the party making it."

FIRE INSURANCE—INSURABLE INTEREST—JUDGMENT CREDITOR.

S, who was a judgment creditor of L. Brothers, insured a warehouse of his debtors, worth \$1300, in his own name, for \$900, to cover his debt. The nature of his interest was known to the company when the policy was issued, but when there was a loss it refused to pay the insurance on the ground that the policy was a wager policy, there being no insurable interest in the creditor. In the action for the insurance—Sparre vs. Home Mutual Insurance Co.—in the United States Circuit Court, District of Oregon, Judge Deady, in deciding the case, said: "1. The person insured must have an interest in the property insured or he can suffer

no loss by its destruction; but a judgment creditor, when by statute, as in this State, his judgment is a lien on the real property of his debtor, has an insurable interest in the buildings thereon to the extent of his judgment, the land, with the buildings, being a security for his debt. 2. But as he cannot enforce his lien if he can find sufficient personal property to satisfy the judgment, he must show by his complaint for the insurance money that there is not sufficient personal property to satisfy his debt, and that he must resort to the real estate for its payment, or he does not state enough to justify a recovery against the insurance company."

SALE OF MINING SHARES—SPECIFIC PERFORMANCE.

Shares in a mining company were bought from H by F, and on the refusal to deliver them suit was brought to compel the performance of the contract. There had been no sales of stock, and it had not been put on the lists of any of the stock exchanges. In this case—Frue vs. Houghton—the Supreme Court of Colorado, in affirming the decree in favor of the plaintiff, through Judge Beck, said: "The authorities agree that specific performance of a contract may be enforced of contracts for the delivery of personal property, as well as for the conveyance of real estate. And as specific performance will always be decreed of a contract when compensation cannot be had at law by damages, a court of equity will compel the delivery of the shares of a corporation which have been sold, if there is no way to determine the market value of the stock."

PARTNERSHIP—INTEREST IN ASSETS.

A partnership was dissolved and the accounts between the partners settled. The books showed a balance due one of the firm of \$999.52. After the settlement, the partner to whose credit the balance stood, sued the other members of the firm for it—Lambert vs. Griffith—but was defeated. An appeal was taken to the Supreme Court of Michigan, and the decree was there affirmed. Judge Campbell, in the opinion, said: "The complainant has ground for his suit. The interest which a partner has in a firm consists usually, if not always, in his share of the assets after all the accounts are settled between the partners and the debts paid. This credit of \$999.52 appeared distinctly on the books, and must necessarily have formed a part of any such accounting."

Spontaneous Combustion of Coal.

The following letter, addressed to the British Board of Trade by Messrs. Lindsay & Co., of London, and relating to the subject of spontaneous combustion of coal, will be read with interest by shipowners and others interested in this important question:

The question of spontaneous combustion of coal cargoes on long voyages is of such vital importance to shipowners and underwriters, and has received so much attention from your board, that the following information, which we have to-day received from the captain of our bark Inchgreen, concerning his experience on a voyage from Dundee to San Francisco with a coal cargo, is our excuse for troubling you with a long letter. The subscriber would have written you last year on the subject, but, unfortunately, did not personally see Captain Miller, who was otherwise so much engaged during the short time the vessel was in this country that they had no opportunity of learning the particulars of the outward voyage. The Inchgreen sailed from Dundee on the evening of the 22d of April, 1881, with 1500 tons of Watson's splint coal on board for cargo. These were shipped during fine weather, and, so far as we can remember, were perfectly dry when being loaded. The vessel has got two decks, 'tween-decks being laid, with the exception of a middle space of 3 feet running right fore and aft, for which there are hatches, but with coal cargoes these are not put on. With this particular cargo the coals were about 2 feet from the main deck from the after hatch to the fore hatch, sloping down at both ends, leaving a free space of about 40 feet aft and about the same forward on the 'tween-decks. The ship is very well ventilated, having two bell-mouth ventilators on forecastle, the forward one 7 inches diameter at deck and 14 inches at bell-mouth, the after 9½ inches diameter at deck and 16½ inches at bell mouth, ventilating both lower holds and 'tween-decks; a ventilator of 11 feet by 9 inches through the house on deck between fore and main hatches for the 'tween-decks only; another 3 feet square, ventilating lower holds and 'tween-decks abaft mainmast; another, 2½ feet square, ventilating 'tween-decks about 12 feet from after collision bulkhead. With ordinary cargoes, such as sugar, &c., the forward and after ventilators alone are used, and so well has the ventilation been arranged that with a cargo of low Manila sugar it was impossible to detect that there was sugar on board from the smell on the vessel's arrival in London; and at present, with a cargo of Java sugar there is not the slightest appearance of sweat or discoloration on any of the baskets, so far as can be seen, thus showing the thorough efficiency of the ventilation. On the 12th of May, after being three weeks out from Dundee, in lat. 36° 14' N., long. 19° W., Captain Miller discovered that the coals were heating, and that there was a dense vapor rising from them, which the ventilation then in use did not seem capable of carrying off. He caused a passage to be dug from the main hatch forward, and with the view of improving the ventilation, cut a circular opening in one of the fore hatches, into which he shifted one of the forward ventilators, erecting a small windmill at its mouth, he believing this would draw off the vapor and heated gases much more rapidly than by the ordinary action of the ventilators. The coals at this time had become so heated that it was almost impossible to stand on them, and Captain Miller was very apprehensive of the safety of his ship. Soon after the application of the windmill an improvement was observed, which daily continued, until at the end of three weeks there was no sign of heat in the holds, the coals continuing cool until the termination of the voyage at San Francisco on the 2d of October, 162 days from Dundee. At that particular time, nearly all the ships sailing from Dundee and arriving at San Francisco were more or less affected

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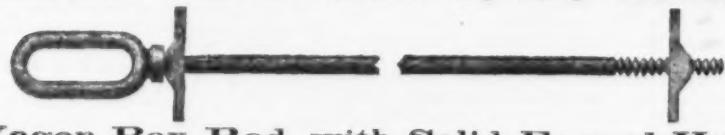
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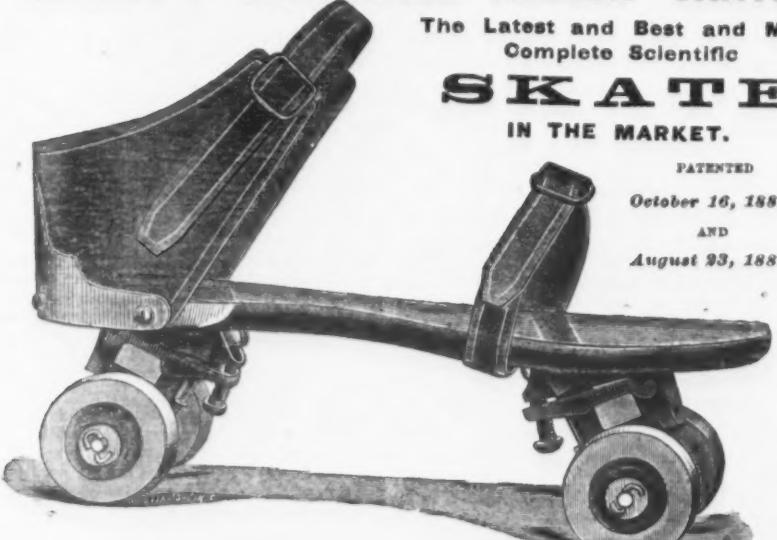
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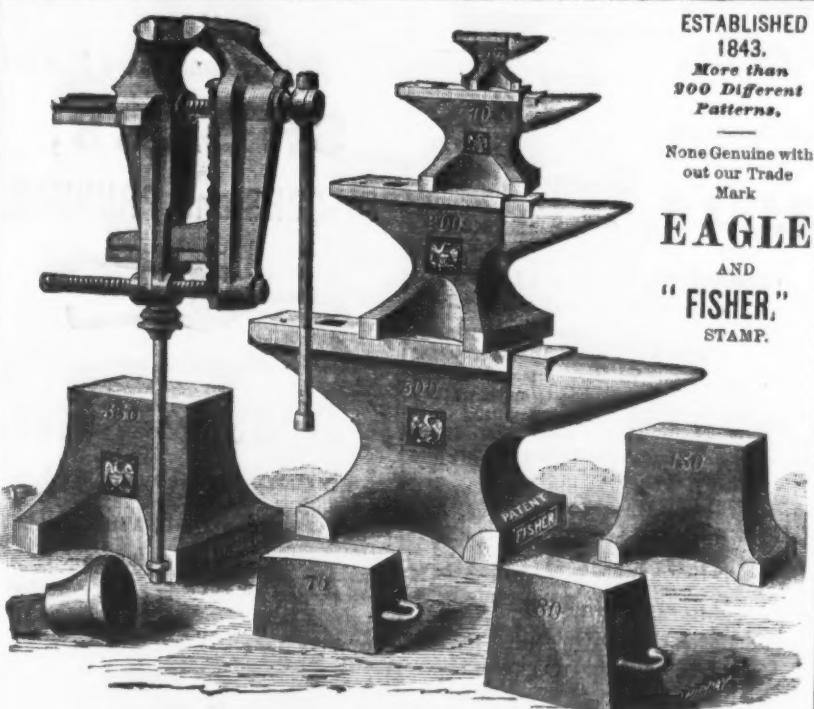
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by fire in their cargoes. We think it probable that the Inchgreen's immunity from fire is owing to the simple contrivance arranged by Captain Miller, and we bring the matter before you with the desire of its being made known to shipowners and shipmasters loading similar cargoes.

English Iron and the American Market.

The Ironmonger publishes the following communication from "A well-informed firm at Liverpool:"

It need scarcely be said that English manufacturers take a deep interest in the American iron trade. Prior to the enormous development of the home production the United States were steady and growing customers for all descriptions of iron and tin plates, but during the last 10 years the demand has been uncertain and spasmodic. This will be manifest from the following figures, showing the imports of iron and steel into the United States during the respective years:

	Tons.	Tons.
1872	717,665	2,112,342
1873	282,716	1,322,767
1874	317,434	1,343,859

Such sudden expansion and contraction could not fail to have very decided effects on the English iron trade, and experience has proved beyond all possibility of contradiction that the effects are, on the whole, decidedly injurious to the best interests of that trade. This has been more manifest in the history of the last two or three years than at any former period. In 1872-73, for example, the upward movement in prices was greater and extended over a much longer period than in 1879-80. In the former, prices steadily advanced from the end of 1871 to the middle of 1873, while the later movement, beginning at the end of 1879, had expended its utmost force by the beginning of 1880, and since that time, notwithstanding an exceptionally large trade, the fluctuations have been of quite a moderate character, as the following table of highest and lowest prices of Scotch warrants will show:

	Lowest Price.	Highest Price.
1872	51/	72/
1873	73/	137/6
1874	101/	145/7
1875	49/	68/6
1876	44/6	73/3
1877	45/	53/6
1878	46/3	53/1

During the same period the extension of the home production in America has been quite remarkable, say from 2,854,558 tons in 1872 to 5,178,122 tons in 1882, and this has enabled the United States (except during periods of exceptional demand) to supply her own requirements without much help from other countries. The recollections of the "boom" (as it was called) in 1879-80 are rather unpleasant, and the experience of many merchants has taught them a lesson, which is likely to affect future transactions with the United States. During the sudden rise in prices considerable contracts were entered into by American buyers, and as many of these were made at high prices, difficulties such as had not been anticipated were experienced, and the ultimate results were certainly disastrous to one, if not both, parties. Whether the conclusion be right or not, the impression left on English dealers is that the Americans did not come out of that business so well as had been anticipated, nor did they maintain that high character for which they previously had credit. One reason, no doubt, was that their long absence from the English market, and dealing for so long a period in almost exclusively American irons, rendered American buyers unfamiliar with the quality of English makers, and difficulties arose in consequence. In future, however, these points must be borne in mind.

The late changes in the tariff led some to anticipate a considerable increase in our trade with America. Others argued that, as the changes were made by the party favorable to protection, it might be fairly assumed that the changes would be such as could be borne by the home producers, and not sufficient to admit of any large foreign imports. This latter view appears likely to be the more correct one. It is anticipated, however, that the principle of free trade with foreign countries once being admitted, we may look for further changes favorable to foreign competitors. These changes, however, must be slow and gradual, so as not to harass the manufacturers and laborers who are largely interested in the home production. The uncertainty, however, which is now likely to prevail respecting the future tariff on imports must seriously affect the further development of home industries, and this of itself must be beneficial alike to the manufacturers of the United States and England, as it has been the great expansion of the last few years which has led to the present depression. With respect to the new tariff which comes into operation on July 1, it is anticipated that in consequence of the hurried manner in which the bill was drawn up there will be found to be several anomalies, the effect of which may be injurious or beneficial to the American manufacturer, just according to the way in which they are interpreted by the Treasury authorities.

Wind Pressures.—A writer in *Longman's Magazine* says: "Three years ago we were startled and horrified by the news that the Tay Bridge had fallen when a train was passing over it, and the investigation which followed brought into prominent notice not only the very great diversity of opinion as to wind pressure, but the necessity that some definite result should be arrived at. It appeared from the examination of engineers of the highest repute that they had no exact knowledge as to whether the extreme probable force of wind should be taken as 10 pounds on a square foot, or 20 or 40. It was admitted that pressures of 40 pounds had been registered, but they were considered so exceptional and restricted that it had been deemed unnecessary to make a full provision for them. But on October 14, 1881, a pressure of 53 pounds was registered at Greenwich almost at the very moment when 35 magnificent trees in the immediate neighborhood were prostrated; that particular gust of intense pressure was by no means re-

stricted to an area of a few yards. Nor is this pressure of 53 pounds the highest that has been recorded. During a gale at Liverpool in March, 1871, the pencil anerometer was driven far beyond the scale, and was estimated to have marked a pressure of 90 pounds. It is impossible to say whether these are actual pressures or not. Professor Stokes, who speaks with high authority, considers that the register of a pressure plate is 80 per cent. too high, a correction which would reduce these pressures to 30 and to 50 pounds to the square foot; but many observers and men of great practical experience (among others Mr. Osler and Mr. Symons) believe that the registered pressure is, by a balance of errors, not very far from the truth."

New Hand Shear for Cutting Flat and Round Iron.

The occasional need in every shop of a tool for cutting plates and round bars of iron and other metals gives importance to a new tool designed for such work, shown in the accompanying engravings, and manufactured by the Eureka Shear Co., No. 810



New Hand Shear.—Fig. 1.—Gauge Set for Shearing, with Wire-Cutting Die.

Market street, Philadelphia. The combination of a wire cutter with the blade of a shear is not entirely new, but we have never before seen the latter placed back of the pivot nor in the form of a die, as in this case.

The inventor claims for this tool that the No. 1 shear will cut rounds up to 1/4 inch in diameter, and flats up to 3/8 inch. The body of the shear is made of cast steel, and the die and cutters of superior tool steel. As will be seen from the

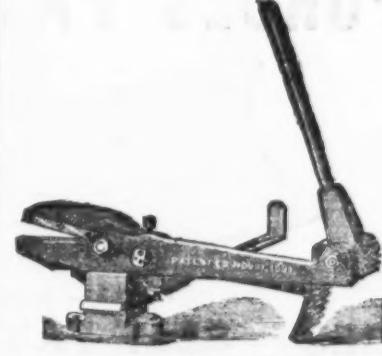


Fig. 2.—Gauge Set for Wire Cutting.

accompanying engravings, the shear may either be bolted to the bench or clamped in a vise, for which purpose shoulders on the base are provided, thus insuring the great convenience of placing it at any time wherever most needed in the shop. The power obtained by the arrangement of lever with pinion and rack is obvious. For the cutting of round iron a die is inserted in the fixed arm of the shear, while the movable arm carries the cutter. In the die holes of three different sizes are drilled. An adjustable gauge is attached to the shears, so as to insure cutting to the required length. This adjustable gauge is movable and may be attached underneath the die for cutting rounds, or underneath the flat shears, or may be removed altogether if wide sheet metal is to be cut.

Driven-Well Patents.

The Federal Court at Des Moines, Iowa, on the 19th inst. rendered an opinion on the question of the validity of Nelson W. Green's driven-well patent, a case that has been pending for some time. The court holds that there are two well-established instances of prior use of the principle involved in this patent, one of them being at Independence, Iowa, where a well was sunk in the early summer of 1861, and the other at Milwaukee, where a large number of them were put down as early as 1849, the patent to Green not having been issued till 1868, and the application of the principle not having been discovered and put into use by him until after the well at Independence was proved a success. The court holds that Colonel Green made no effort to prevent the use of his discovery by the public for about seven years, and it is upon this showing, more than the fact that the Iowa and Wisconsin wells anticipated Colonel Green's discovery and application of the principle, that the patent is held void. The court also held that the issue was void for the reason that it set out a broader claim than was contained in the original patent. Over 300 actions, principally against farmers, for damages, were pending in this court on this patent. Many more had confessed judgment and settled at heavy costs, and still others had paid the royalty exacted by the drive-well agents, who, a few years ago, swarmed over the Iowa prairies hunting up causes for action. So annoying had these persecutions become that a defensive alliance of farmers was formed, and many defended their premises with shot-guns against the incursions of drive-well agents, and in several instances mob law was threatened. The result was an appeal to the courts, with the result as announced. If sustained by the Supreme Court the farmers of the Northwest will have gained a signal victory over a heretofore most exacting monopoly.

A daily paper commenting on this subject

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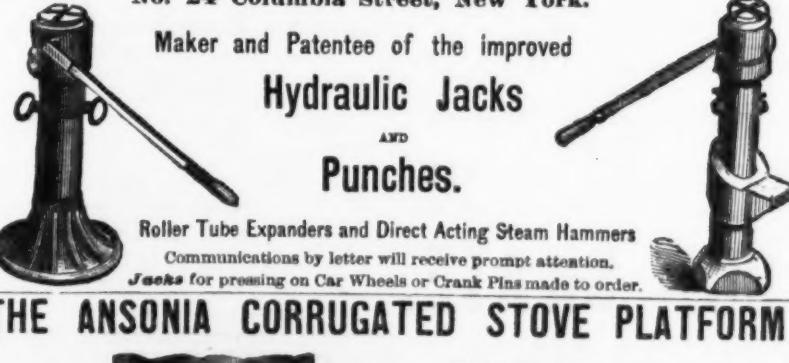
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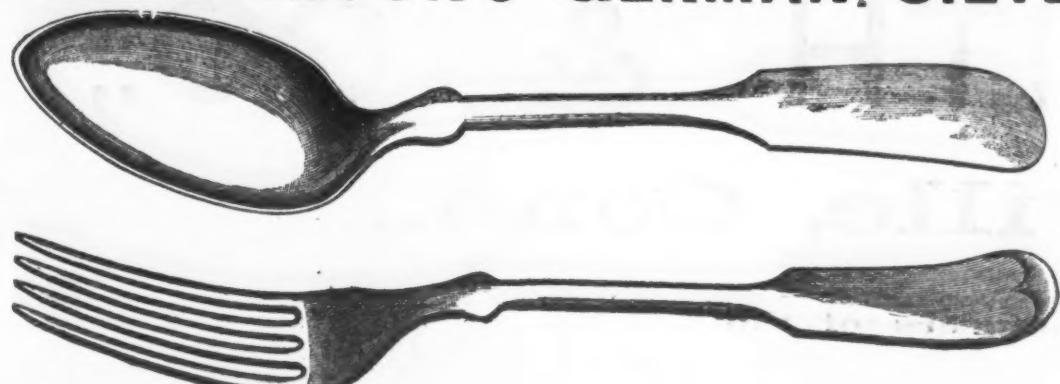
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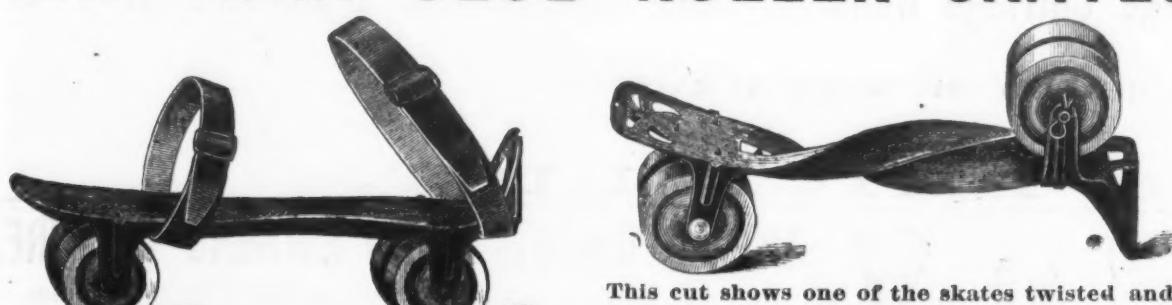
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In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

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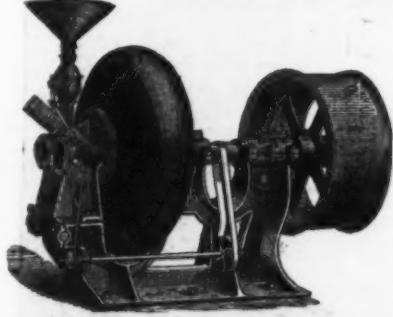
This cut shows one of the skates twisted and bent cold.

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has the following: "The contest between the farmers and the owners of the driven-well patent, to which public attention was recently directed by Judge Shiras's decision against the patentee, in Iowa, is one of the great legal battles of the West. In the State of Indiana alone there are 50,000 of these wells, for each one of which a royalty of \$10 is demanded, and it is said that ex-Senator McDonald, whose ambition points toward the White House, has endangered his political popularity among the Democratic farmers by acting as attorney for the patentee. The interests involved are so great that the legal status of the controversy is especially interesting. At the recent hearing in Iowa, Judge Nelson, of the United States Circuit Court of Minnesota, and Judge Love, of the United States Circuit Court for the Northern District of Iowa, sat with Judge Shiras. Judge Love concurred in Judge Shiras's decision and Judge Nelson dissented. The appeal will not bring these cases before the Supreme Court of the United States for the first time. When the hearing in Iowa began, an appeal taken by the farmers from a decision made by Judge Gresham, of Indiana (now Postmaster-General), was pending in Washington, the case being that of Wahl against Hine. Only eight of the Supreme Court Justices sat at the hearing of that appeal. The Court was equally divided, four justices being on one side and four on the other, so that the Supreme Court must try again. An appeal from the New Jersey district will probably be reached before the appeal which will go up from Iowa. In the meantime the patentee's application for an injunction prohibiting the Indiana farmers from using their wells has been denied. The conclusions of fact found by Judge Shiras are these: That Colonel Green, in 1861, being then in command of the Seventy-sixth Regiment of New York Infantry, put his method of driving wells into public use for the benefit of his regiment, thereby abandoning his invention to the public; and that his invention was in open and public use, with his knowledge and acquiescence, for more than four years before he applied for a patent thereon. In these four years the public acquired rights through the open and uninterrupted use of the discovery. Judge Shiras holds that it necessarily follows from these conclusions of fact that both the original and the reissued letters patent are invalid and void."

found that the hard wire had about double the strength of the soft. Nine pieces were taken from each reel for test, under prolonged static stress, and were suspended from hooks attached to springs, in order that the effect of jar should not enter into the experiment. They were then loaded with, respectively, in each set, 25, 50, 85, 80, 75, 70, 65, 60, 55 per cent. of the average ultimate strength, as already determined. This was done in November, 1881. Since that date a number have broken as follows:

Per cent. max. static load.	Time under stress.	
	Hard wire (unannealed).	Soft (annealed).
95	80 days.	3 minutes.
90	35 days.	5 minutes.
85	17 mos. unbroken.	1 day.
80	91 days.	26 days.
75	Unbroken.	17
70	"	455
65	"	"
60	"	455
55	"	"

Thus, wire loaded with but 65 per cent. of the breaking load, as usually determined, broke after being subjected to stress for a period of 15 months when annealed, while hard wire carrying 85 per cent. of the maximum temporary load remains unbroken after 17 months. It is seen that these results are the same in kind as those obtained by Vicat, and confirm the conclusion that heavily loaded iron, as well as other metals and the woods, are likely to yield ultimately under loads that are sustained for short periods of time without apparent injury. This fact has been amply proven by earlier investigators; but the difference above observed between hard and soft iron has, so far as Professor Thurston has been able to learn, never, until now, been discovered.

Tests of Rail Joints.

A correspondent of the *Railroad Gazette* gives some interesting particulars relating to experiments with rail joints recently made at the works of the Bethlehem Iron Co. Three joints were tested: 1. The standard joint of the Lehigh Valley Railroad, made with the Fritz & Sayre angle joint-bar. 2. The standard joint of the Pennsylvania Railroad, which uses a modification of the Fritz & Sayre joint-bar. 3. The standard joint of the Lehigh Valley, except that the ends of the rails were cut at an angle of 60°. Short pieces of rails of 57 pounds per yard with the joint bars were furnished by the Bethlehem Iron Co. for No. 1 and No. 3, and by the Pennsylvania Railroad Co. for No. 2. The bearings were placed exactly 2 feet apart, and the pressure applied in the center immediately over the ends of the rails, which were left about 3-16th inch apart. The weight of the Lehigh Valley joint-bars was 40 pounds per pair, and of the Pennsylvania 36 pounds per pair. The tests were made by Mr. Maunsell White, of the Bethlehem Iron Co., on one of Riehl's improved testing machines. The accompanying table shows the deflections in each joint due to the pressure applied:

Power applied. Pounds.	Deflection.		
	Penn. R. R. L. joint, inches.	V. R. R. joint, inches.	Miter joint, inches.
10,000	.000	.005	.016
12,000	.033	.033	.037
Load removed.	.008	.003	.005
15,000	.038	.040	.034
17,500	.073	.070	.044
20,000	.110	.054	.051
22,500	.117	.053	.055
25,000	.138	.070	.060
27,500	.158	.065	.077
30,000	.149	.100	.088
Load removed.	.135	*	.040
32,500	.168	.125	.109
35,000	.204	.150	.122
Heads of rails came together.	.315	.173	.168
37,500	.240	.150	.156
40,000	.273	.173	.168
42,500188	.188

*Neglected to record this.

Conductivity of Carbon.

A contribution to the theory of the carbon telephone transmitter is to be found in recent researches by Messrs. J. Probert and A. W. Soward. It has long been known that carbon has the power of absorbing and condensing gas within its pores, and also that resistance of carbon powder to an electric current through its mass is not a true resistance, but may be resolved into two factors—namely, the true resistance of the carbon particles and the resistance of or disturbance occasioned by the gas or air confined within the existing spaces. In blocks of solid carbon the air spaces are naturally smaller, and the resisting or disturbing influence is weaker than in the case of carbon powder, but still it exists, and the experiments of the gentlemen above mentioned prove that the conductivity of porous carbon in different gases at different pressures varies with the chemical nature and density of the absorbed gases.

Effect of Prolonged Stress on Annealed and Unannealed Iron.

Prof. R. H. Thurston, of Hoboken, recently had occasion to study the effect of prolonged stress upon the various materials in common use in the arts, and, among others, upon the finer qualities of iron. He states that, so far as he is aware, the well known experiment of Vicat, made a half-century ago, had never been repeated. The extreme importance of the results obtained by him had apparently not been realized by either physicists or engineers, and it seemed advisable that the experiment be repeated, and, should the results obtained by Vicat be again reached, that the attention of both scientific and practical men should be again called to the subject. The repetition of Vicat's experiment has not only confirmed his conclusion, but has led to the discovery of a new and important, as well as peculiarly interesting, difference in the effect of prolonged stress upon annealed and unannealed iron. In the autumn of the year 1881, Professor Thurston procured two lots of the best Swedish iron wire from the Trenton Iron and Steel Works, the wire having been specially drawn for the purpose. This wire was divided into two parts, one being carefully annealed, the other being left hard-drawn as it came from the blocks. These were tested in the usual way, and it was

Utilization of Blast-Furnace Slag.

Mr. A. D. Elber, of Hoboken, N. J., has applied for letters patent for the conversion of blast-furnace slag into desulphurized silicates, and the preparation of the silicates for use in the manufacture of china, statuary, fine cements, &c. Mr. Elber starts with the production of mineral wool from slag by the injection of steam into the slag while in fluid state. The most remarkable features of this new process are: 1. That it allows of adjusting the air volume in the fibrous slag to the most desirable proportion for perfect reduction. 2. That, while ground or granulated slag will be found very difficult of treatment, the fibrous slag can be converted into desulphurized silicates with almost absolute certainty by uncomplicated, rapid and comparatively inexpensive treatment. The fibrous slag is commercially known in England as slag wool or silicate cotton, and in the United States as mineral wool, which latter name will be adopted for fibrous slag in the following description of experiments. The presence of soluble sulphur in mineral wool is detected by testing with acidulous liquids; ordinary writing ink is a convenient reagent, and if it is brought in contact with the wool the well-known smell of sulphurated hydrogen will be readily noticed. A Hessian crucible is filled with such wool,

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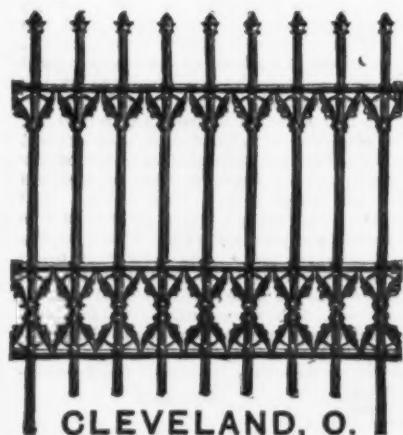
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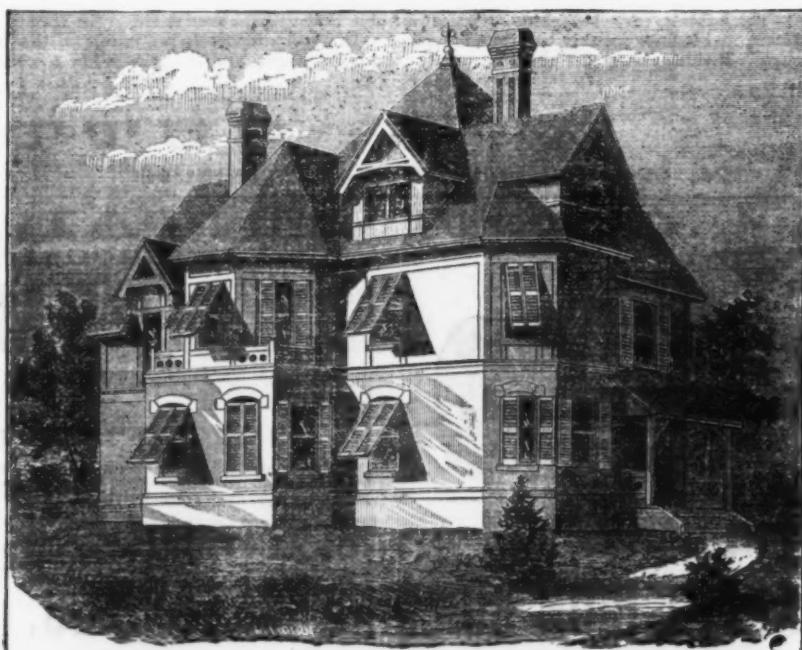
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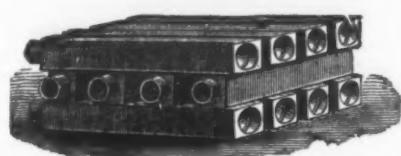


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using little more pressure than is necessary in stuffing a pipe with tobacco; the crucible is then placed into the fresh-glowing coal fire of a stove or range and allowed to remain there about an hour. It will then be found to contain, beginning at the bottom:

1. Fused desulphurized slag, forming the crust of

2. A fritted, porcelain-like mass, often spotted with iron oxides.

3. A mass of whitish, soft silicate, containing some impurities.

4. Greenish, sensibly sulphurous, partly opened silicates.

5. A spongy, dark mass, in which the fibers are yet discernible.

6. On top: Nearly unchanged mineral wool

By reheating No. 4, No. 3 is obtained; Nos. 5 and 6 may be reduced in the same ratio, and if the heat is just sufficient the whole charge may be converted in one heat to the most desirable condition, which for most purposes is that of the No. 3 specimen. This desulphurized and easily friable silicate is finely pulverized, and after being purified by washing is then ready for use in the arts, as slag-silicate of lime, alumina and magnesia. Its color is pure white; if it has a darker shade it may not have been thoroughly desulphurized, as the testing with acid will show. Mixed with water only, the silicate may be cast in molds, but it will scarcely be sufficiently plastic to be formed by hand, unless a more aluminous earth or clay is added. The plasticity of the silicate may, however, be brought to a high degree after treatment with diluted sulphuric acid, and if the acid solution is not used to excess it is presumable that its chemical action will be mainly confined to the formation of sulphate of lime and to the proportionate setting free of silica.

For quick preparation the silicate is sparingly moistened with a strong solution of four parts, by weight, of water to one part of acid, when the formation of sulphate of lime is readily noticed. After slight stirring and quick washing with more water, the latter is drawn off until the mixture becomes lusterless and apparently nearly dry. It is then ground for about a minute in a mortar, the luster reappears, the mass becomes viscous like putty, and can then be formed and air-dried at ordinary temperature. If the mass contains unneutralized acid, and is put away for weeks, then broken up, soaked in pure water and worked over, its plasticity and fineness have increased. The hard-fritted and partly fused specimens (Nos. 1 and 2) are not easily attacked by acids, but after mixing in finely ground or sand-like condition, cementation will set in gradually and the mass will become very hard. The roasting and desulphurizing process is also applicable, if mineral wool has first been soaked in a solution of starch in water and then dried, or if it has been coated or impregnated by condensation of hydrocarbon vapors from heated asphaltum, &c. In both preparations carbonization and burning of the carbon will set in during roasting; the comparative advantages of either admixture are, however, not yet determined. If Mr. Elbert succeeds in eliminating the dangers that beset all porcelain masses containing iron in any combination whatsoever, he has very likely succeeded in the production of a valuable commercial product.

Tornadoes.

Sergt. John P. Finley, Signal Service officer at Kansas City, Mo., has published, in a pamphlet on tornadoes, some useful directions concerning the course to be taken to escape the attending danger. The inhabitant of a tornado-frequented district must be watchful in the season of visitations, for he can never know when the destruction will come upon him. On the first sign of the approaching vortex he must run—always to the north, unless by going in that direction he will have to cross the entire path of the storm. If he is nearer to the southern edge than to the center of the probable path, he may go south, bearing slightly east; but in no event should he ever run directly to the east or northeast. It is impossible to save any building that may lie in the path of the tornado, or any property that cannot be got out of its way. No material, no method of construction, can be competent to resist the raging destruction. Nothing rising above the ground can escape it. The most practicable measure of precaution is to construct a "dug-out" at some suitable point, within easy distance from the house, to serve as a place of refuge or shelter. The retreat should be entirely underground, with a roof at least 3 feet thick, not rising above the surface of the earth, and entered from the northern or eastern side. A "cellar-cave" may be constructed from the cellar, if the house has one, to serve as a substitute for the "dug-out." It should be excavated from the west wall of the cellar, toward the west, and should be made as complete and secure as the "dug-out." If, however, the storm cannot be escaped, if no refuge is at hand, or there is not time to get to it, the safest thing to do is to place one's self against the west wall of the cellar, face forward, or against the south wall, as near the southwest corner as possible. The northeast quarter is in any case a fatal position, and should always be avoided. If one is actually overtaken by the tornado, his only resource is to cast himself face downward upon the ground, with his head to the east and his arms thrown over his head to protect it. If a stump or large stone, or anything heavy, that the wind will not blow over, is near, he may get a trifling protection by throwing himself to the eastward of it. If in a house with no cellar, he should get into the west room, on the ground floor, if possible, and away from all stoves and heavy furniture. The people of towns might find it to their advantage to provide for having a watch, to be on duty on all days when the air bears the premonitory symptoms of a violent wind-storm, to give a signal to the whole population on the appearance of the first real threatening signs. The signs of the formation and approach of a tornado cloud are distinct and sufficiently suggestive to afford opportunity for timely and concerted action. Sergeant Finley is continuing his investigations of the phenomena of tornadoes, and he has prepared three full schedules of minute inquiries calling for the facts attendant upon the appearance of the storms, which he sends to persons who were within

the path of one, who were on the outer edge of the path, and who were from 10 to 100 miles from it.

OBITUARY.

WALTER J. MORRIS.

Walter J. Morris, who died of pneumonia at St. Luke's Hospital, Wednesday evening of last week, was a man with a very interesting history. Born in Richmond, Va., 47 years ago, he early showed great fondness for mathematics and engineering. While but a boy he was employed on extensive surveys, and one of his first feats was to lay out the town of Manchester, on the James River, opposite Richmond. Then he went to Missouri and surveyed the Iron Mountain Railroad, of which he became the chief engineer. Next he was employed as engineer for the town of Paducah, on the Ohio River. When the Civil War broke out he was appointed chief engineer on Gen. Albert Sidney Johnston's staff, and came very near being killed when his commander fell at the battle of Shiloh. His bravery and general ability attracted so much attention that he was promoted to command the engineers on General Polk's corps, which was the largest corps in the Confederate army. His next position was chief of engineers in Gen. Dick Taylor's department, which included Alabama, Mississippi and Louisiana. At the close of the Rebellion Mr. Morris went to South America and assumed a prominent part under General Meigs in building two lines of railway for the Peruvian Government in the Andes. It is now said that that Government owes him 2½ per cent. of \$27,000,000 for his services as engineer, contractor, &c. From South America he went to Turkey and took part in certain breach-loading-rifle negotiations, and afterward he surveyed a railway for Turkey through the Balkans. Then he came to New York, projected the Broadway underground railway, was the engineer of the South Ferry and direct-transit enterprise in Brooklyn; also of the Huntsville, New Orleans and Western Texas road. Just before his death the Turkish Government was negotiating with him to resume charge of his old railway system in Turkey.

WILLIAM MASON.

William Mason, proprietor of the Mason Machine Works, died May 21, at Taunton, Mass., aged 76 years. He was a native of Mystic, Conn., and early developed a wonderful mechanical genius. He went to Taunton in 1836, and soon after invented the self-acting mule, now universally used in cotton spinning. In 1842 he became owner of the works of Crocker & Richmond, his employers, and he gradually extended them, until now they employ 1000 men and manufacture all sorts of machinery, including locomotives, printing presses, cotton machinery, machine tools, furnaces, &c. The business passes into the hands of his sons.

Demand for Farm Implements in the Northwest.—A letter from San Francisco says that business has increased greatly during the past year, and especially as regards trade with Oregon and Washington Territory. The impetus which it has received is consequent upon the large immigration of practical farmers who have taken up small farms there, and who are the principal purchasers, either directly with firms in San Francisco or through agencies in the northwest. A representative of a large Eastern house stated that shipments to Oregon and the north generally had increased fully 50 per cent. during the past 10 months, and that trade at the present time is unexampled. The demand was principally for farm wagons, plows and headers, which were forwarded by fast freight. If it were possible to carry on the business of supplying the wants of immigrants on easy installments, he had no doubt the demand would severely tax the supply, but the great drawback to this would be the difficulty of finding proper security for final payment for the articles shipped by manufacturers of agricultural implements. It is understood that the business is assuming great proportions, and that the field is daily growing more important. This view of the situation is borne out by an inspection of cargoes going north, as all Portland steamers for the past six weeks have carried large quantities of farming implements, including threshers, plows, wagons, &c., consigned to firms in Portland.

Immigration flows in briskly at Castle Garden, but Secretary Jackson, of the Immigration Commission, adheres to the opinion, expressed earlier in the season, that the total will fall short of last year's about 100,000. The total for all the ports in the United States for the ten months ended April 30th compares with the corresponding period last year as follows:

	1882.	1883.
England and Wales.....	46,073	63,733
Ireland.....	36,810	46,339
Scotland.....	11,123	13,511
Wales.....	5,073	1,207
Alaska.....	14,000	18,000
Italy.....	20,105	24,075
Norway.....	12,518	10,225
Sweden.....	21,311	33,524
Dominion of Canada.....	53,101	73,917
All other countries.....	57,347	73,463
Total.....	417,829	544,601

As will be seen from the above, Germany sends nearly three to one, compared with Ireland. Political difficulties in Ireland have as yet had no appreciable effect on the movement of population. The general condition of emigrants arriving, physically and financially, continues up to a fair average.

An exceedingly large blue-print frame is used at one of the Northern Pacific Railroad shops. The glass is a heavy plate, measuring 4 x 8 feet. It is bedded in a frame that swings on trunnions and is adjustable in any direction. It is mounted on a carriage running on a track, and can easily be run in and out of the blue-print room, where all the work of preparing and making the blue prints ready is done.

A national Hungarian exhibition is projected to be held in Buda-Pesth in 1885. The Government, it is said, has already promised a subsidy of 400,000 florins (about \$162,000).

The Iron Age

AND Metallurgical Review.

New York, Thursday, May 24, 1883.

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First Page.—Interesting Relics for the Chicago Railway Exposition. The Oldest Alpine Tunnel. New Rail Cambering Arrangement.

Third Page.—New Rail Cambering Arrangement (Concluded).

Fifth Page.—Some Points About Boilers.

Second Page.—Some Points About Boilers (Concluded). Latest Legal Decisions. Spontaneous Combustion of Coal.

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The Pig Iron Production of the Northeast.

An examination of the statistics of the production of pig iron in the United States discloses the singular fact that in the production of this essential raw material the Northeastern part of the country is not keeping pace with the growth of the nation generally. It is not necessary to cite statistics to prove that the consumption of pig iron in New England, New York and New Jersey is now very much greater than it was ten years ago, for the fact is apparent to everybody. Factories of all kinds have been built, enlarged and improved in this part of the country to such an extent that the daily consumption of pig iron is far beyond what it was in 1872.

The consumption in rolling mills has also increased, but not in the same ratio. The natural territorial sources of pig-iron supply for the Northeast are the New England States, New York, New Jersey and the Lehigh Valley of Pennsylvania. That these sources have not made much progress in production in the past ten years is shown in the following table of their total yearly production, compared with that of the United States:

Years.	Net tons.	Per cent. of the U. S.
1872.	866,634	30
1873.	811,798	28
1874.	752,087	28
1875.	635,945	28
1876.	478,910	23
1877.	621,734	27
1878.	738,892	28
1879.	702,213	26
1880.	1,129,531	26
1881.	1,108,268	24
1882.	1,211,570	23

In the Northeast the increased production of 1882 over that of 1872 is only 40 per cent. The production of the United States in the same time increased from 2,854,558 tons to 5,178,122 tons, or over 80 per cent., which is twice the rate of increase in the Northeast. The State of Pennsylvania alone in that time increased from 1,401,497 tons to 2,449,256 tons, or 75 per cent. It seems very singular that this Northeastern district, which is very rich in iron ore, and is at no point too distant from sources of fuel supply, should not show greater progress in the production of crude iron. The stove founders, the machine manufacturers, the hardware makers, all are heavy consumers of pig iron, and it would seem to be natural that their neighbors, the pig-iron manufacturers, would endeavor to fully supply their wants and shut out all competitors who have to send their product over long distances to reach this market.

Not only have Scotch and English furnace men made inroads upon the trade of this section, but so also have Southern pig-iron makers, even though they have to pay heavy rates of freight to reach New York and New England. Some Western pig iron also finds its way here. There is no trouble about the quality of the home-made article, for any quality can be produced that may be desired. There seems to be a willingness to permit other manufacturers to enjoy this field, which is shown in the disposition to maintain very high prices, comparatively speaking, and the reluctance with which prices are reduced when outside competition becomes dangerously strong. We see this to-day, when furnaces along the Hudson River and in the Lehigh Valley are being blown out rather than turned out pig iron to be sold at lower prices than outsiders could compete with. We will doubtless see a greater shrinkage in the production of pig iron in the Northeast for some time than elsewhere, simply because our home producers choose to relinquish the market to outside makers rather than to introduce greater economies in the management of their furnaces and sell their pig iron at still lower prices.

This will only be following the plan pursued during the depression of 1873-79. During that gloomy period the annual production of pig iron in the United States fell off 27 per cent. from the year of greatest output to the year of extreme depression, but in the Northeastern district the production made a much greater plunge, falling off 45 per cent. It cannot be possible that in this district the consumption of pig iron fell off more heavily than it did in other parts of the United States. It would therefore seem that the pig-iron producers of this section made less effort to hold their home market than did the manufacturers of pig iron in other sections. There is need of more enterprise in the management of our home furnaces, though it must in fairness be stated that we have a number of them which are well equipped and admirably conducted, and which are therefore always found at work under any circumstances. But in the South and West very many furnaces are rapidly introducing fire-brick stoves and large blowing engines and other modern and progressive appliances, while too many of our Northeastern iron makers are contented to run along with the same old plant year after year as long as they can sell their product for more than it costs them, and then to blow out and lie idle whenever the price falls below that cost. Now is the time to put forth every effort to seize and hold the home market against all comers. If pig iron must be made cheap, which seems to be inevitable, preparations should be put on foot to meet the changed conditions.

It is stated that the New York Central Railroad management is still receiving from Bolckow, Vaughan & Co. steel rails on an old order at \$62 per ton. Mr. Vanderbilt's

cleverness in this matter was widely commented on at the time he placed his orders abroad, but somehow we do not seem to hear as much about it now as we did then.

Direct Processes.

Elsewhere we publish a very interesting letter in defense of direct processes in general, and of the Du Puy process in particular. Since our comments upon a communication from Mr. Menzies relative to the use of magnetic-iron sand in the Siemens direct process have served our correspondent as a text—or perhaps pretext—for his letter, we shall endeavor to dispel the wrong impression which we have—indeed, quite unintentionally—conveyed to him.

In the article in question we said, and are quite prepared now to repeat, that the chemical results of direct processes have always been good, and the commercial results mostly bad. Our correspondent concedes that the first part of this statement "is quite correct," and goes on to say: "The only point not yet satisfactorily settled in the judgment of manufacturers is the certain commercial economy." Evidently there is thus far no issue between *The Iron Age* and Mr. Du Puy. We said, moreover, in concluding the editorial he expects to, that the more general adoption of the direct process in this country is as yet too much hemmed in, as it were, by the cost of ores and labor and the remoteness of the coal from the ore, &c. Mr. Du Puy, after describing his process and giving results that might have been obtained at Safe Harbor under other than the conditions then existing, concludes by saying: "I am prepared to show that with a properly arranged and systematized plant, located at a point where material may be obtained at moderate prices, the cost of direct iron in bloom will be very little over the cost of pig iron." Precisely, and, as we said, under exceptionally favorable circumstances the direct process may prove a commercial success. In the meantime, however, it must not be forgotten that by the use of the Danks-Bouvard puddling furnace, pig containing 0.82 per cent. phosphorus can be made into iron containing not more than 0.082 per cent. of that element, and that thousands of tons of such iron have been made with a coal consumption of not more than 1161 pounds of coal per 2240 pounds of iron. Our correspondent says nothing about the loss of iron in his direct process. As the rule, we know that in the blast furnace there is no loss, in puddling a loss of about 8 per cent., and in the crucible none. In the Bessemer process the loss is slightly heavier than in puddling, while in the different direct processes the loss varies from 20 to almost 100 per cent.

Our correspondent expresses his belief that the direct process will offer a solution of the questions which the recent tariff legislation has opened, especially the one of how to cheapen the manufacture of steel in this country in order to meet English competition. Perhaps not. We have in Virginia brown ore, yielding 50 per cent. of iron, which is mined for 50 cents per ton and delivered at the blast furnace for about \$1.50 per ton. Extensive deposits of the same kind of ore are also found in Alabama and Georgia, costing about \$1.25 delivered at the furnace, and yielding from 45 to 50 per cent. of iron. The Red Mountain ore of Alabama is from a so-called fossil deposit of large extent in the midst of coal fields. It costs at the mines about \$1.25 per ton, and yields 52 per cent. of iron. In North Tennessee the same description of ore is found. Another ore bed of excellent quality is represented by the Cranberry vein in North Carolina. Nearer by we have the wonderful Cornwall ore banks, near Lebanon, and still nearer to the Hudson River Valley the Columbia County carbonates and the Chateaugay magnetites, which are quite fully described in an article printed elsewhere in this issue. Mr. I. Lothian Bell estimates the average percentage of iron in all the ore raised in Great Britain at somewhat less than 35 per cent., while the production of the American mines, similarly considered, is about 56 per cent. Less than 12½ per cent. of the English ore is fit for the Bessemer acid process, while nearly 33 per cent. of the American ore is sufficiently free from phosphorus to be used in this process. Considering, therefore, that with the high iron average of our ores (56 to 35 per cent., as against English ores), the American iron maker has 20 cwt. of ore less to handle per ton of iron produced, we think a far more promising solution of the question of foreign competition may be found in the use of the cheap ores obtainable in many localities, rather than in recourse to as yet doubtful direct processes—at least until it has somewhere been demonstrated that under conditions which exist commercial success is attainable in practical working. We are fully prepared to admit, without further demonstration, that under such conditions as might exist—in one's mind, for instance—any one of half a dozen direct processes would revolutionize iron-making in this country.

In the amended Penal Code as lately passed by the New York Legislature and approved by the Governor, Section 266 of the original act is amended to read as follows: "Section 266.—All trades, manufactures, agricultural or mechanical employments upon the first day of the week are prohibited, except that when the same are works of necessity they may be performed on that

day in their usual and orderly manner, so as not to interfere with the repose and religious liberty of the community." Under this law the question will have to be decided whether the work usually done about blast furnaces on Sunday, and which is much the same as that done on other days of the week, is necessary or unnecessary. It is possible, as experience has shown, to run a furnace without Sunday work, and there are a great many good people who strictly maintain that Sunday charging is wholly unnecessary. Most ironmakers consider it an essential condition of good working that a furnace should be charged and tapped the same on Sundays as other days, and this involves the usual amount of labor. It is interesting to note that this code makes some nice distinctions.

For example, we find in Section 267: "All manner of public selling or offering for sale of any property upon Sunday is prohibited, except that articles of food may be sold and supplied at any time before 10 o'clock in the morning, and except also that meals may be sold to be eaten on the premises where sold or served elsewhere by caterers; and prepared tobacco in places other than where spirituous or malt liquors or wines are kept or offered for sale, and fruit, confectionary, newspapers, drugs, medicines and surgical appliances may be sold in a quiet and orderly manner at any time of the day." We question whether a law which thus discriminates in favor of certain lines of trade and against certain others will be of much value. It is rather loose legislation. If it is proper to prohibit the sale of merchandise on Sunday, there is no reason why distinction should be made in favor of tobacco, newspapers, confectionary and fruits. The moral purpose of the law is defeated by such discriminations, and its hygienic purpose—if it has any—is, to say the least, impaired by them.

The outlook for lead seems to be no better in Europe than it is on this side. We have been told over and over again by English papers claiming authority in the matter, that below £13 Spanish lead is so ruinously low that Spanish production must necessarily be curtailed; still it goes on increasing all along, as the amounts exported show (the values are in pesetas or francs):

	Tons.	Value.
1878.	97,842	45,362,807
1879.	100,336	50,140,180
1880.	92,400	45,160,809
1881.	105,800	53,743,355
1882.	116,132	53,650,116
Total.	505,519	248,376,227
Jan and Feb.	14,508	6,148,164
1881.	79,220	9,810,704
1882.	20,450	9,112,826

prefer—indeed, they are better able—to take such a reduction from the hands of the arbitrator than from the hands of a committee of their own.

The Driven-Well Patents.

As will be seen by an article elsewhere printed in this issue, the United States Circuit Court of Iowa has rendered a decision adverse to the Green patent in a case involving its validity. This, we believe, is the first decision adverse to the patentee which has been rendered during years of litigation in defense of their patent. But as the Circuit Court of Iowa is a court of as high jurisdiction as that of any other United States Circuit, its decision adverse to the patent may be held to be a fair offset to all the decisions which have been obtained in favor of it in other circuits.

We have not yet received a copy of the text of this decision, which we hope shortly to get, and will print in full when received. From the synopsis which has reached us we learn that the Court holds that there are two well-established instances of prior use of the principle involved in Nelson W. Green's patent, one of them being at Independence, Iowa, where a driven-well was sunk in the summer of 1861, and the other at Milwaukee, where a large number of such wells were put down as early as 1849. The Green patent was not issued until 1863. It was not until some seven years after that Colonel Green made any effort to prevent the use of his alleged discovery by the public, and it is upon this showing, more than upon the fact that the Iowa and Wisconsin wells antedated his invention, that the patent is held to be void. The court also holds that as the patent under which it is now sought to restrain infringers is a reissue which claims more than was covered by the original patent, that fact alone invalidates it under the recent decision of the United States Supreme Court defining the status of such reissues.

It is not our intention to discuss this matter editorially until the full text of the decision of the Iowa Circuit Court shall have reached us. It is, however, an important matter of news to very many of our readers, and for this reason we lay before them such facts as have already come to our knowledge. We would remind them, however, that it would be unwise to place too much confidence in the permanence of the victory which the Iowa farmers have won over the Green patent. There are at least eleven, and we believe thirteen, United States Circuit Court decisions affirming the validity of this patent, and among them a decision by Judge Blatchford, late of the New York Circuit, but now of the United States Supreme Court. In Judge Blatchford's court a case involving the validity of this patent was heard in great detail and decided very emphatically. In most of the other circuits, if we are not mistaken, Judge Blatchford's decision has had great weight in determining the ruling of their presiding judges.

An appeal will be at once taken from the decision of the Iowa Circuit Court to the United States Supreme Court, but as a decision cannot be reached in less than three years, the validity of the patent may be held to be an open question during that interval. Meanwhile we think it doubtful if the owners of the Green patent will be able to enforce their claims for royalties. They may perhaps do so in circuits in which favorable decisions have already been reached, but, pending an appeal to the Supreme Court, it is doubtful if circuit judges who have not already been called upon to pass judgment on the merits of the patent will care to hear such cases, or to issue any injunctions on the strength of decisions favorable to the patent already on record. Before the United States Supreme Court decision can be reached the patent will have expired, and in view of this fact we should think it scarcely probable that the owners of the Green patent would take any further steps to collect contested royalties. If the reports which reach us are true, their patent has already been a source of immense revenues, and, although entailing a very heavy cost in litigations, it has repaid this cost many times over.

The Congressmen on the Labor Situation.

In an editorial last week we copied and commented upon the letters written by a number of Congressmen to the officers of the Amalgamated Association, in which these Congressmen stated that neither the reduction in the tariff nor the condition of the market necessitated a reduction in wages. It is now asserted that these letters were written by Judge Kelley of Philadelphia; Colonel Bayne, of Allegheny, and Major McKinley, of Canton, Ohio, and they have been re-published in the Pittsburgh papers, with the names of these Congressmen to give them additional weight. Assuming that this use of names is by authority, we fail to see that the gentlemen quoted can be considered competent witnesses on this point, or that their opinion respecting the state of trade and the relation of wages to selling prices is worth more than that of any one else not in the business. Such expressions of opinion from public men are injudicious, to say the least. They put the employer in a false position before the workmen, they impeach the statistics of the trade, and, if incorrect, encourage the workmen to resistance when every consideration of prudence and self-interest should prompt them to meet the manufacturers in a liberal and reasonable

spirit. It is but just to say, however, that no one knows whether such letters were ever written or not, or, if written, by whom.

There is another phase of this question. In our editorial of two weeks since we quoted from a Pittsburgh paper, in which the report stated that the manufacturers insisted upon the passage of the new tariff bill. We characterized this statement as false and absurd. In answer, the Amalgamated Association states in its column in the *Labor Tribune*

there are living Congressmen who stand ready to prove, in public if necessary, that the gentlemen mentioned in the editorial referred to in the Pittsburgh *Dispatch* did force its passage, and Mr. Jarrett and other workingmen opposed it. The good old honest protectionist, Judge Kelley, had such pressure brought to bear upon him by Pittsburgh iron men that he had to succumb to their wishes, the new bill was passed, and then the iron men, through the press, accused the honest old gentleman of "weakening at the last moment." Why did McKinley, Bayne, Miller, of Mercer County, and a host of other true protectionists, vote against the bill? The iron and steel workers, notably the members of the Amalgam-

A Visit to the Hudson River and Chateaugay Mines.

On the morning of Tuesday, May 15th, a very pleasant company of gentlemen assembled at the Grand Central Depot, in this city, for an excursion to certain properties of which comparatively little was previously known, but which are destined to exercise a very important influence in shaping the future development of the Eastern iron trade. These gentlemen came together at the invitation of the Hudson River Ore and Iron Co., James A. Burden, president, and the Chateaugay Ore and Iron Co., Hon. Andrew Williams, president. The object of the trip was to inspect the properties of these two companies, and, on the return trip, to take in such other points of interest as lay along the road. The following gentlemen constituted the party: James A. Burden, Troy; Hon. Andrew Williams, Plattsburgh; Thomas Dixon, Scranton; Col. Le Grand B. Cannon, New York; John Fritz, Bethlehem, Pa.; Samuel Thomas, Hokendauqua, Pa.; H. M. Olmstead, New York; David Dow, New York; Prof. H. B. Nason, Troy;

and Iron Co's property was visited, and the points selected were those which afforded the best opportunities of studying the lower vein from its outcrops. The party were carried first to the little quadrilateral at the north end of the property, where the two veins unite, and thence due south along the vein to the openings marked 5, 6, 7 and 8, which were hastily examined; thence to the embryo town of Burden, where the Dickson vein is being worked in a small way with insufficient kiln capacity for a large production. It is our intention to describe this remarkable property more fully at some future time when its development shall have progressed somewhat further. At this time we can scarcely do more than note the impressions gained during a hurried run along the lower vein, with an occasional pause to take in the general situation from some commanding knoll which overlooked the property.

The Hudson River Ore and Iron Co.'s property is without doubt one of the most valuable in the country, everything considered, and can only be compared to the wonderful Cornwall banks, near Lebanon, though not resembling them in anything except extent and ease of working. The Hudson River ores are carbonates, and are probably more like the Cleveland ironstones than like any American ores found in sufficient quantity to make them important. Their existence has long been known, and they have been mined in small quantities for testing at frequent intervals during the past few years. They were known to be abundant, but their actual extent was not guessed at. Those who have not tried them have, naturally enough, concluded that there must be something wrong with them or they would have been utilized.

Those who have tried them have made mistakes which, in the light of present knowledge, are amusing. Carbonate iron ores are ores of which our practical ironmasters know very little. They are unlike any other ores in color, appearance and composition. They do not look like ores at all, but would be readily mistaken for some kind of limestone of little or no value for any purpose, unless possibly for building purposes or stone fences. The cap rock, on the other hand, looks like very good ore. It is a conglomerate limestone, colored almost to the appearance of brown hematite by oxide of iron, the quantity, we believe, being equivalent to about 16 per cent of metallic iron. Misled by appearances, those who have looked at these deposits in a practical way have chiefly worked on the cap rock, and whenever they struck ore they gave it the go-by, concluding that it was an underlying limestone of no economic value. In one furnace in which this cap rock was tried it was found that 5 per cent, in admixture with other ores worked very well, but that 10 per cent made the furnace sluggish and yielded hard iron unfit

to any important village to have even a prospective speculative value. The irregular tract of land shown in the diagram was acquired quietly, and not until all this preliminary work, extending over about two years, had been completed was the fact that valuable ores had been found mentioned. Mr. Burden then offered one-half of his purchase to a few friends, the company was formed, and before the first snow-fall of next winter not less than half a million dollars will have been invested in mining plant, kilns, railroads, buildings and shipping facilities. The property lies within three-quarters of a mile of the river at the northern end, and gradually recedes until at its southern end it is two miles distant therefrom. Ore mined at any point which would naturally be selected for development can be delivered, roasted, in cars or vessels at the river without handling. Gravity will move it every foot of the way from the mouth of the pit to the car or boat in which it is to be carried to the consumer, or to the tunnel heads of furnaces built along the river banks. At the company's docks there is 30 feet of water, with depth of channel for vessels of large size going south. The upper Hudson has all the depth of water needed for ore boats going north, and very favorable freight arrangements have already been made with the New York Central and Hudson River management.

We have spoken of the Hudson River carbonates as of unusual chemical composition. The following are some of the analyses of which we have secured reports:

By A. S. Bertolet, of samples taken from the Crown Point stock pile (not dated):

Alumina oxide	1.97
Manganese oxide	3.19
Calcio	4.05
Manganese	0.39
Silicic	8.76
Phosphoric	0.053
Iron	57.32
Phosphorus	0.024
Sulphur	0.67

By F. G. Lodge, chemist of the Burden Iron Co., of samples from stock pile at Troy work, May 11, 1863:

Silica	8.68
Lime	3.65
Magnesia	3.22
Metallic iron	58.95
" manganese	1.91

By A. S. Bertolet, from samples from Crown Point stock house:

April 9.	12.	15.	19.
Iron	51.67	51.00	50.88
Silica	0.74	0.74	0.86
Phosphorus	0.039	0.039	0.044
Sulphur	0.719	0.719	0.692

By the same chemist, March 16, 1863:

Iron	51.16	Phosphorus	0.039
Silica	0.50	Sulphur	0.55

By the same chemist, March 15:

Iron	50.85	Sulphur	0.65
Silica	0.03	Phosphorus	0.032

These analyses are all of roasted ore. They show that the Hudson River carbonates are unique in being of quality admirably suited for Bessemer iron. Even the small percentage of sulphur shown, though disposed of in the blast furnace, will be expelled from the ore when roasted more slowly in higher kilns. Those at present in use are roasted in 15-foot kilns, which are unsatisfactory in many respects. The company are now building three kilns, each 20 feet inside diameter and 60 feet high. Each will have 200 tons capacity per day. The principal object of the roasting is to expel the carbonic acid. With these three large kilns the company will be able to ship 600 tons of ore per day, and the number of kilns will be increased to 10 as soon as machinery for raising and handling 2000 tons per day can be put in operation.

It is the intention of the company to mine these ores in large quantities, and to sell them at prices which will give consumers in the East an advantage fairly offsetting the cheaper fuels of the West. A vast tonnage with small profit per ton is the settled policy of the company. It will probably be some time before the immense importance of these deposits is appreciated by the iron trade at large, but perhaps an interest will be excited when we say that, in the opinion of all of those who have seen them whose opinions on such points are of value, they are destined to make the Hudson River Valley the center of an immense production of cheap iron. Probably one-third of all the iron made in Great Britain at the present time is made from carbonate ores. Neither of the two great European sources of supply—the Cleveland and the Luxembourg deposits—are comparable in quality with those at our own doors. The Hudson River ores average above 50 per cent, in metallic iron, and are practically free from phosphorus. They are self-fluxing, work easily and freely alone in the blast furnace, and are most desirable for mixture with magnetic or other ores. They can be mined very cheaply, and could not have been better located had nature consulted the convenience of consumers. Both veins run with surprising uniformity for a distance of fully five miles. They are each about 18 feet thick, giving an average of 36 feet of ore throughout their entire length. The cap rock is firm and dense and no timbering is required; the underlying shales give a solid floor. The Cleveland deposit consists of one vein, 18 miles long and about 12 feet thick. From this, 6,000,000 of tons of ore were taken out last year. There is no reason why as much ore could not be taken in a year from the 36 feet of the Hudson River property should the market demand it. In a word, the available supply is equal to the greatest possible requirements of consumption for a period very much longer than present estimates need take into consideration. The Hudson River carbonates solve the problem of cheap ores for Eastern consumers at least, and we have yet to discover that in any respect is their importance second to that of any deposit yet found in this country, everything considered.

All this will, no doubt, be regarded as very interesting, and the trade will hear of these ores with surprise and pleasure, but during the last 10 years any one might have had them, in whole or in part, for the cost of the farms which hold them. "If we had only known!" will be the moral exclamation. But who is to blame for this lack of knowledge? In *The Iron Age* of November 9, 1874, the leading editorial, about three columns in length, discussed these ores in great detail, and gave information as to their extent and value, which, in addition to

a, a, a. Hudson River Ore and Iron Company's Railroad.—b, Plant of Roasting Kilns.—c, c, c, The Dickson Vein.—d, d, d, The Cannon Vein.—Nos. 1, 2, 3, 4, Mine Openings on Dickson Vein.—Nos. 5, 6, 7, 8, Mine Openings on Cannon Vein.—e, e, e, Hudson River Railroad.

MAP OF THE HUDSON RIVER ORE AND IRON COMPANY'S PROPERTY.

ated Association, reverse these gentlemen for their courage and manliness in not voting for a bill (even though the manufacturers wanted it) that they saw would be likely to call for even a small reduction of the wages of their constituents—the ironworkers.

This thing might just as well be fought out first as last. We deny utterly the statements made by the Amalgamated Association. We deny *in toto* that the manufacturers—meaning the iron manufacturers—wanted the present tariff bill. We deny that the Pittsburgh iron men brought such pressure to bear upon Judge Kelley that he was forced to succumb to their wishes, and we assert that McKinley, Bayne, Miller and others voted against the bill at the request of the Pittsburgh iron men. We assert that the Western Iron Association, nearly a majority of the members of which are Pittsburgh iron men, again and again passed resolutions unanimously against the Senate bill, and demanded that the Tariff Commission bill or none be passed, and that its secretary and a committee went to Washington several times to carry out the instructions of the association. And we further state that we believe that whoever wrote the articles in the Amalgamated column above referred to, stating that the Pittsburgh iron men wanted the tariff in its present shape, asserted what he knew to be false. Did Messrs. Jones, Chalfant, Lloyd, Fitzhugh, Herron, Park, Spear, Weeks, Keating, Painter, all of whom visited Washington, urge the passage of the present bill? Every one of them opposed the tariff bill in its present form as earnestly as any Amalgamated Association official, and they began earlier.

The first steel rail rolled in America was turned out at the North Chicago Rolling Mill Co.'s works, in Chicago, May 25, 1865.

Austin G. Gorham, New York; James Morris, Troy; George Henry Warren, New York; Wm. E. Coxe, Reading; A. Van Santvoort, New York; George A. Hoyt, Stamford, Conn.; C. F. Young, Honesdale, Pa.; J. Avery Richards, Boston, Mass.; Howard H. Burden, Troy; W. M. Habershaw, New York; C. B. Houston, Chester, Pa.; N. W. Horton, New York; Jos. J. Albright, Scranton, Pa.; E. C. Lord, Morristown, N. J.; James C. Bayles, New York; Charles F. Mattes, Scranton; Judge James Matthews, New York; Robert Oliphant, New York; W. H. Wallace, New York; George S. Dixon, Scranton; Hon. Smith M. Weed, Plattsburgh; R. Forsythe, Chicago; Hon. S. P. Brown, Plattsburgh; Prof. D. M. Green, Troy; Theodore Voorhis, Albany; F. S. Hodge, Troy; A. S. Norton, New York; V. M. Oliphant, New York; A. Tower, Port Henry; A. H. Masten, New York; D. M. Kendrick, Albany, and perhaps a few others whose names cannot now be recalled. Some of the gentlemen included in the above list joined the party *en route*, but the number of those starting from New York was great enough to comfortably fill the two sleeping-cars which had been provided for the accommodation of the company.

At the hour named in the invitation (10.45 a. m.) the two sleeping-cars moved out of the Grand Central Depot, attached to the Hudson River R. R. train leaving at that time. The run to Burden Station was uneventful, and was just about long enough to afford the members of the party a chance to become acquainted. A delightful little lunch was served in the cars, and thus fortified the party were quite ready to leave the cars and stretch their legs by a climb over the picturesque hills of the west shore of the Hudson. Carriages were waiting on the dock, however, and the party were carried very comfortably up the wagon road which the company have opened along the line marked a a a in the accompanying diagram, and beside which is staked out a railroad not yet built. Only a small part of the Hudson River Ore

for foundry purposes. As the result of this and similar empirical tests, the Hudson River carbonates have never been counted of much value. In fact, they were never classed as carbonates at all, but were considered rather lean spathic ores, unlikely to invite development so long as better ores were accessible.

The recognition of their true character and the organization of a scheme of development calculated to give them the greatest possible value for all classes of consumers is due to Mr. James A. Burden. There was no lucky chance or accidental discovery in the matter. Returning some years ago from a foreign trip, during which he had carefully examined the Cleveland ironstones, Mr. Burden decided that if there were any carbonates in the Hudson River valley, or near enough to Troy to be of value to him, he would find them. Experienced geologists were retained and set to work to search wherever the geological formation indicated the probability of iron ores being found. Both sides of the river were carefully examined and the search extended from New York Bay to Lake Champlain. These experts had always at command the resources of well-appointed laboratories for chemical analysis, and reported everything they found, whether of great or small importance. In due course they reached the carbonates in the Hudson River shales, and for the first time they were examined by strictly scientific methods. Their true character was defined, and samples of the ore were forwarded for analysis. The results were so surprising that they were regarded as improbable, and further examinations were ordered. Repeated proofs being secured, and the outcrops of the veins traced for several miles, it next became a matter of interest to determine their extent. The points at which the deposits showed, or came near enough to the surface to be accessible, were fixed, and it was found that the total area could be acquired without serious difficulty, as it comprised only farm lands not near enough

to any important village to have even a prospective speculative value. The irregular tract of land shown in the diagram was acquired quietly, and not until all this preliminary work, extending over about two years, had been completed was the fact that valuable ores had been found mentioned. Mr. Burden then offered one-half of his purchase to a few friends, the company was formed, and before the first snow-fall of next winter not less than half a million dollars will have been invested in mining plant, kilns, railroads, buildings and shipping facilities. The property lies within three-quarters of a mile of the river at the northern end, and gradually recedes until at its southern end it is two miles distant therefrom. Ore mined at any point which would naturally be selected for development can be delivered, roasted, in cars or vessels at the river without handling. Gravity will move it every foot of the way from the mouth of the pit to the car or boat in which it is to be carried to the consumer, or to the tunnel heads of furnaces built along the river banks. At the company's docks there is 30 feet of water, with depth of channel for vessels of large size going south. The upper Hudson has all the depth of water needed for ore boats going north, and very favorable freight arrangements have already been made with the New York Central and Hudson River management.

We have spoken of the Hudson River carbonates as of unusual chemical composition. The following are some of the analyses of which we have secured reports:

By A. S. Bertolet, of samples taken from the Crown Point stock pile (not dated):

Alumina oxide	1.97
Manganese oxide	3.19
Calcio	4.05
Manganese	0.39
Silicic	8.76
Phosphoric	0.053
Iron	57.32
Phosphorus	0.024
Sulphur	0.67

By F. G. Lodge, chemist of the Burden Iron Co., of samples from stock pile at Troy work, May 11, 1863:

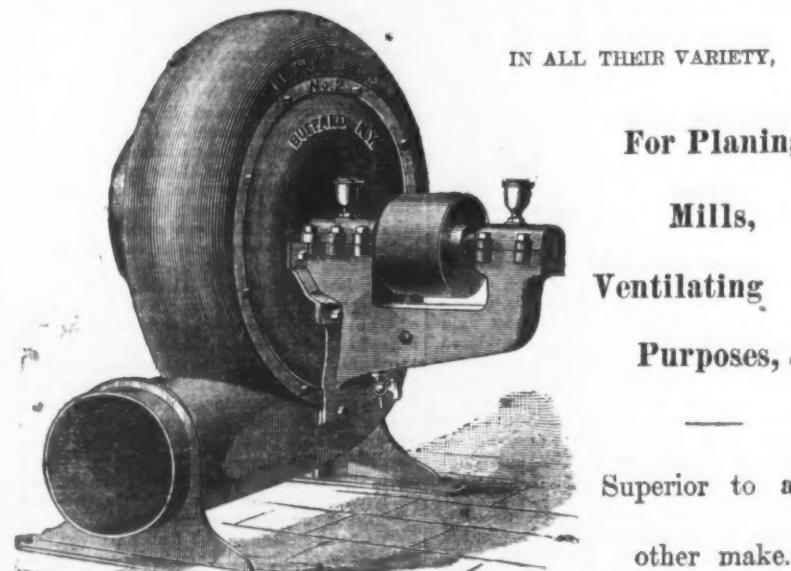
Silica	8.68
Lime	3.65
Magnesia	3.22
Metallic iron	58.95
" manganese	1.91

By the same chemist, March 15:

Iron	50.85
Silica	0.03
Phosphorus	0.032

These analyses are all of roasted ore. They show that the Hudson River carbonates are unique in being of quality admirably suited for Bessemer iron. Even the small percentage of sulphur

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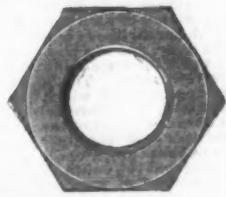
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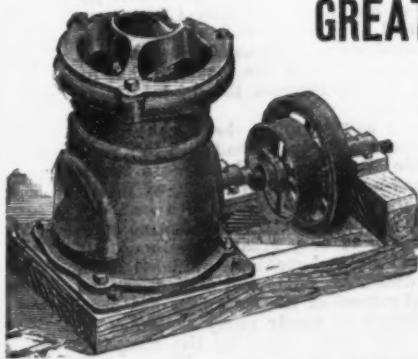


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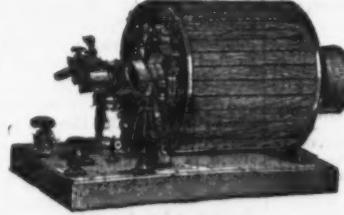
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PATENTED:

Aug. 27, 1873, No. 130,853. Dec. 2, 1873, No. 145,105. Aug. 25, 1874, No. 154,460.
Nov. 10, 1874, No. 156,669. May 7, 1878, No. 203,272.

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Alumina	3.27	Titanic Acid	
Magnesia	.76	Sulphur	58
Lime	1.65	Soda	
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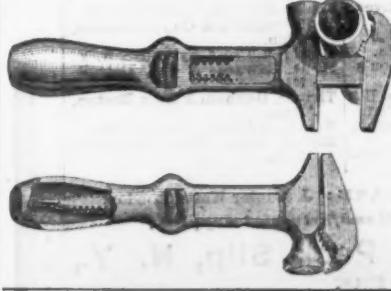
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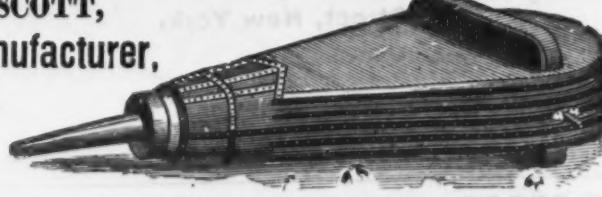
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raised to the third floor, some 40 feet above ground, and dumped upon an inclined platform, which feeds it to a giant crusher of the Blake pattern. In the jaws of this monster the masses are reduced to a uniform size, about corresponding with that of egg coal. It then goes through two smaller crushers in succession, and is finally passed between chilled rolls, which make it almost as fine as sand. It is then passed into a Conkling circular jig, where it is separated in the usual way.

At Lyon Mountain the company have quite a town already, and one which is destined to grow. It has at present a population of about 3000. Its public buildings include two churches, three schools, with a fourth in progress, a large store, a comfortable little hotel and a sort of general pleasure-house, where amusements and refreshments of a proper kind will be furnished cheaply. Within less than two years more than \$500,000 have been expended in plant and improvements on the company's property, which by no means represents the total investment.

As there is enough in and about Lyon Mountain to profitably occupy a visitor's attention for a week, an effort to see it all within a few hours must inevitably be attended with unsatisfactory results. Equally unsatisfactory must be any attempt at a description of the property based on notes hastily jotted down while running about from place to place, catching here and there disjointed facts and scraps of information from Mr. A. L. Inman, the general superintendent, and others of the management. Very little time was afforded for anything more than a look about, and then dinner was served at the hotel. This over, the party took carriages for a drive to Morris Junction via Bellmont. The day had begun very cold, but grew more comfortable, although the long ride in open wagons was best enjoyed by those who were fortunate enough to secure blankets in which to wrap themselves. Thus protected, the party looked not unlike a visiting delegation of Indian braves, such as one sometimes seen doing Washington in carriages. However, the roads were good, having been laid with plank for ore cartage, the country was interesting and everybody enjoyed the ride. At Bellmont a brief stop was made to see the largest forge in the country. In this there are 16 Catalan fires, of which the average in use is 14, giving a daily product of from 18 to 20 tons of blooms for fine steel purposes, and which for quality have a reputation only equaled by that of one or two brands of Norway iron. Perhaps the most interesting feature of this establishment is the blowing engine, with its three oscillating cylinders driven by a 44 inch Leffel turbine. As these have their pistons connected with a common crank, their strokes cannot coincide. They deliver the blast under a very steady pressure of about 2 pounds, the pressure gauge showing no perceptible variation. In their several works the company produce 17,000 tons of billets and blooms per annum; last year their ore production was 150,000 tons. Plattsburgh is the shipping port.

Having seen all there could be shown them in a day, and gained enough information to convince every one that the Chateaugay deposit is one of the very greatest importance, the party returned to Plattsburgh by train. On the way thither the writer recalled with fresh interest a letter written by Mr. Jas. A. Burden to Mr. Smith M. Weed, under date of October 9, 1882, and published in *The Iron Age* of October 26. What may have seemed to many an exaggerated estimate of the possibilities of Chateaugay became, in the light of knowledge gained, the safe and reasonable estimates of a clear-headed and cautious business man of large experience. As what Mr. Burden said in that letter has gained added interest from what precedes, we cannot do better than make room for a quotation therefrom:

This property alone, from the veins already explored, is capable (in the opinion of a competent authority who has had the experience and the opportunity to judge of its resources) of producing 6,000,000 tons of Bessemer steel ore per annum. While this is the maximum output of the mine, yet, for the present, it is believed that the possible output to be only one-half of this quantity, which is certainly making a liberal allowance for "faulcs" and other irregularities in the deposits. I therefore call the possible annual output of the Chateaugay mines 3,000,000 tons, a ton of which will make a ton of the highest quality of Bessemer pig iron; and should an iron ore higher in metallic iron than this be in demand, the Chateaugay Company could supply 1,000,000 tons or a 100 per cent concentration of the ore remaining above referred to. Judging from the production from the 1st of January to the 1st of September, 1882, I estimate that the production of the Bessemer steel works east of the Allegheny Mountains, for the entire year of 1882, will be about 600,000 tons of finished Bessemer steel of all kinds, including rails—which would require about 20,000 tons of pig iron in its manufacture, and to produce this amount of pig iron, about 1,000,000 tons of Chateaugay ore would be required. Assuming the annual output of the Chateaugay mines to be 3,000,000 tons, as already stated, it will be seen that the Chateaugay Ore and Iron Co. alone can supply 1,000,000 tons in excess of the total quantity required for Bessemer steel purposes east of the Allegheny Mountains. I estimate that the product of all the Bessemer steel works in the United States for the year 1882 will be about 1,000,000 tons of finished Bessemer steel of all kinds, including rails which would require about 20,000 tons of pig iron to produce this amount of pig iron, 4,000,000 tons of Chateaugay ore would be required, or only 1,000,000 tons in excess of the possible output of the Chateaugay district. It may be asked whether this ore can be mined and sent to market at a price which will bring it within reach of the ore consumers. It is a sufficient reply to this that the Chateaugay Ore and Iron Co. are now delivering their ore to their customers at \$3.50 per ton, or \$340 pounds at Plattsburgh, Lake Champlain, and surrounding points; a ton of the ore will make 1 ton of pig iron. The freight from Plattsburgh to tidewater on the Hudson is \$1 per ton of 220 pounds, and from the Hudson low rates of freight by water can be had to Pennsylvania, New Jersey and other iron-making districts.

Large as these figures may seem, they are fairly and demonstrably within the truth. Considering the Hudson River and Chateaugay deposits together, their unit value to the Eastern iron trade is simply inestimable. Used together these ores make a mixture possessing all the advantages which could be desired. We have seen all the great iron-ore deposits thus far developed in this country, and are measurably well informed as to the special advantages of cheap iron production claimed by various districts, but taking everything into consideration, and basing estimates on cost and transportation charges simply, we have yet to hear of a place where iron can be made and marketed more cheaply than on the shores of New York Bay or along the banks of the Hudson River. In fact, we

know of no location possessing equal advantages.

At Plattsburgh the party were entertained at supper by the proprietor of the Foquet House, and later in the evening had some rare fun in their own dining-car, with speeches and the presentation of testimonials to favored members of the company. Among the gifts dispensed were a piece of plate to Mr. Thomas Dickson, a supply of anthracite to Mr. Jas. A. Burden, a plethoric purse to Mr. J. J. Albright, a membership in the Cobden Club to Col. Le Grand B. Cannon and a diamond bosom pin to Mr. Samuel Thomas. For further particulars these gentlemen may be consulted.

At 9:45 next morning the party, refreshed and rested, were carried to Crown Point furnaces, where a brief stop was made. These furnaces are too well known to our readers to need description. They are working very well on a half-and-half mixture of Chateaugay and Crown Point, and 30 per cent. Glassburg coke to 70 per cent. anthracite. The larger furnace has been run up to 100 tons a day, and during six weeks averaged 85 1/4 tons, receiving a little over 12,000 feet of air per minute, at a temperature of 1000°. The magnetic mixture above mentioned was smelted with 1 ton 5 cwt. of fuel to the ton of pig.

The remainder of the trip must be very briefly described, not because it lacked interest, but because so much space has been given to the two great ore deposits that but little remains for the incidental features of the trip, which were somewhat too hurriedly seen to give material for notes of value. From Crown Point the party were carried to Troy, where time was given for a run through the Burden Iron Co.'s works. The admirable system, perfect order and phenomenal cleanliness of the several departments were noted with surprise and pleasure, and the new offices were much admired. The special then ran to Albany, where a delightful dinner was served in the dining-car, and the night was passed comfortably at the Delavan. Friday morning the home run began on the track of the Delaware and Hudson Co.'s road, with Scranton as the first objective point. Here the party were taken in carriages to the elegant new shops of the Dickson Mfg. Co., which were illustrated and described in *The Iron Age* of April 26, 1883. The locomotive shops of the company were then visited, and finally their blast furnaces, with a run on the way thither through the steel works of the Lackawanna Iron and Steel Co. From Scranton to New York two director's cars accommodated the 14 gentlemen who remained to complete the round trip, and, as we have already intimated, this little company had fun enough to the mile to add a great deal to the average of the whole trip. Mr. Austin G. Gorham was the best possible organizer of such sports, and about him the whole party gathered by a common instinct. Songs, stories and a series of most unconventional speeches passed the time so pleasantly that Hoboken was reached all too soon, but not until the following motion, duly offered and seconded, was put by Mr. A. Williams, and carried with boisterous enthusiasm:

Resolved, That we make a like excursion next year to the Hudson River and Chateaugay Mines.

Resolved, That this resolution be published in the *The Iron Age*.

In concluding this hasty and unsatisfactory story of the trip, we think it but just to Mr. D. M. Kendrick, General Passenger Agent of the Delaware and Hudson Canal Co., to say that its complete success is due to the executive ability displayed by him in its management. The distance traversed was, we believe, about 1050 miles. During the entire trip there was not one accident, mishap or delay. Everything was carried out exactly as planned, the arrangements were perfect in every detail, and there was not one unpleasant incident from beginning to end. Mr. Kendrick organized and managed the excursion throughout, and supplemented his efforts by carrying sunshine wherever he went. A better or brighter man than Mr. Kendrick is yet to be found, and we suspect he is not yet born.

The Du Puy Direct Process.

To the Editor of *The Iron Age*: The comments in your paper of the 11th inst., upon the recent tests of magnetic-iron sand by Mr. Menzies in the Siemens rotator at Landore, are, I think, somewhat calculated, unintentionally, to convey a wrong impression, and generally to prejudice the use of direct processes.

Your statement "that the chemical results of direct processes have always been good" is quite correct, for some of the most experienced steel makers, both here and in Europe, have arrived at this conclusion after a series of very careful tests. "Direct" iron melted in crucibles has been found equal in every respect to the best steel made from the best brands of Swedish iron, while in the open-hearth, in large quantities, with the usual pig bath, the quality has proved itself of unsurpassed excellence. The only point not yet satisfactorily settled, in the judgment of manufacturers, is the certain commercial economy of direct iron for steel uses, and this doubt perhaps I may help to clear up by contributing herewith some facts which as yet have not been brought to public attention.

My direct method of operating is mechanically to press the ore or cinder mixtures into molded shapes of about 8 1/2 by 9 inches, by 17 inches in length. In order to secure a quick heat penetration they are so perforated in molding that no part of them exceeds 2 inches in thickness. It is found that molds of this size contain 100 pounds of separated magnetic-iron sand, besides the carbon, &c., mingled with it. When they are placed on end, spaced a few inches apart over the bottom of a furnace like an ordinary double puddling furnace, in three hours, without materially changing shape, and without labor upon them other than to keep up a reducing heat, they will be changed to iron. This iron will readily stick together, may be balled to the desired weight, squeezed to blooms, and without reheatting rolled to long smooth bars.

Last year Mr. David Reeves, president of the Phoenix Iron Co., directed several old single heating furnaces to be rearranged at

Safe Harbor, where his company were then manufacturing puddle bar. These furnaces had about 28 square feet in the clear bottom surface. They were run continuously on this process night and day, week in and week out. They each regularly made six heats every 24 hours. The actual time of the six heats, including the cleaning of the grate bars, was about 20 hours, the furnaces being generally idle in all about 4 hours out of the 24, between the turns. The wear and tear of these furnaces was found to be about the same as in puddling pig iron. Not only were molds of rich magnetic ore reduced, forged and rolled to bars at one heat from these furnaces, but also refractory puddle cinders, squeezer cinders, and the general run of rail cinders, as well as lean ores. These materials were all tested separately and together, and alike were all squeezed and rolled to long bars at one heat. It was found that by this process about 500 pounds in bars could be made at a heat from these refractory cinders. The furnace capacity, however, was proved to be too small. As so little labor was required at the furnace the operator could readily have taken care of three times the weight of metal, had its size been sufficient to contain the material. Besides this, the heats were somewhat retarded in these furnaces by the direct firing. Every charge of fresh fuel on the grates perceptibly oxidizes some iron, as well as lowers the temperature of the furnace for the time being.

In gas furnaces with reversing valves the reducing heat is more uniformly maintained and controlled, and with a more economical consumption of fuel. Added to this, gas furnaces may be of much larger capacity, and, there being no direct firing to chill and waste the metal, or delays in order to clean grate bars, the heats may be hastened to less than three hours. Experience has determined that this process may be best operated in gas furnaces of about 6 1/2 to 7 feet width, and about 20 feet length clear in the bottom. Such furnaces will readily contain 100 molds, and as each mold is found to contain 100 pounds of magnetic-iron sand, the furnace charge may be about 10,000 pounds at a heat. Now, it has been proved that rich magnetic ore reduced in gas furnaces had produced over one-half its weight in blooms; hence it is reasonable to expect that, with separated magnetic-iron sand, these furnace charges will turn out 5000 pounds at a heat, or 30,000 pounds of iron in six heats every 24 hours.

The consumption of fuel for gas furnaces of the size referred to for heating blooms—which require a much higher heat than the reduction of ore—warrants the conclusion that 1 ton of coal will be sufficient to produce 1 ton of blooms, or that 30,000 pounds of blooms made from magnetic-iron sand in 24 hours will require about 30,000 pounds of coal. With leaner material than these magnetic sands, of course the furnace output will be proportionately less. The cost of gas furnaces of this size, including producers, &c., all complete, will not exceed \$8000. If rich lump ore is used, the cost of crushing and grinding it will be about \$1.50 per ton in bars more than if made from the prepared iron sand.

Without needlessly further consuming your space, suffice it to say that what I have herein stated may be easily proved, item by item. I am prepared to show that, with a properly arranged and systematized plant, located at a point where material may be obtained at moderate prices, the cost of direct iron in blooms will likely be very little over the cost of pig iron. The low cost of such direct blooms, now recognized to be equal in quality to Swedish iron, for which steel makers are now paying an average of \$80 per ton, would seem to commend this manufacture as a new and specially profitable industry. Particularly at the present time may this be the case, when, under our new tariff, English steels of fine quality are likely to flood the market, to the serious damage of the domestic production. Our exceptionally rich ores, which are preferable for this process, should secure us the advantage over England by this mode of working, because in England rich ores must be imported from Sweden or elsewhere, while we have them at home.

CHARLES M. DU PUY.

INDUSTRIAL ITEMS.

RHODE ISLAND.

Mr. Corliss is building, at his works in Providence, two engines of 500 horse-power each, for the Social Mfg. Co., in Woonsocket.

MASSACHUSETTS.

The Co-operative Foundry Co., of Somersett, have a working capital of \$55,000, and their sales last year reached \$75,000. The company have abundant orders for their works.

A new machine has been completed at Milford for making and driving a clinching screw. It makes the screw direct from a coil of wire and drives it immediately, saving all handling of the fastenings. It will make various sizes of screws, and the change from one size to another is by simply moving a lever. So rapidly does it perform its work that it will make and drive double the number of fastenings that could be made alone by the original machine, thus effecting a great saving of labor.—*Boston Commercial Bulletin*.

The manufacture of jewelers' tools and screws has been commenced at Mansfield.

The stocking mills at Harvard are to be used for the manufacture of cutlery.

The Helicon Electric Light Co. have been organized, with \$150,000 capital, to make dynamo-electric machines for lighting and power, and have commenced work in their shops at Boston.

PENNSYLVANIA.

The Dickson Mfg. Co., of Scranton, have been awarded the contract to furnish the Calumet and Hecla Mining Co., of Lake Superior, Mich., with a steel boiler 90 inches in diameter, 36 feet in length and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 199 3-inch tubes. It is to be made of 1/2-inch steel plate, furnished by the mining company.

to the Dickson Mfg. Co., after testing every plate prior to delivery. The boiler was designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass.

Business is active at the Tenth street foundry of the Reading Hardware Co., and it is possible that it may be continued in operation after the repairs at the Sixth street foundry are completed and it resumes work.

Potts Brothers, of Pottstown, have refused the request of their men that they be paid every two weeks instead of monthly. The firm state that the change would entail additional office expenses, which the present state of the iron business would not warrant, and that the most essential object in now running the mill is to give employment to the men.

The Co-operative Iron and Steel Works have started up their works on steel rails, turning out a small order last week.

The anthracite coal companies have agreed to work full time at the coal mines this week, half time next week, full time the following week, half time the week ending June 9, full time for the week ending June 16, and half time for four weeks following.

William McIlvain & Sons have commenced running their rolling mill in Reading five days per week.

The Pennsylvania Graphite Works, at Byer's Station, on the Pickering Valley Railroad, owned by the Messrs. Young, of Reading, which have been standing idle for several months, are to be put in operation again about the first of June. The company disposed of their works some time ago, and since then they have been in litigation. Matters have now been settled and the works will soon be put in operation.

The mechanical puddler of the Phoenix Iron Co., of Phenixville, is working well since it was put in operation the last time. The great trouble now appears to be with the smelting furnace in connection with it. The company made another experiment last week, which has thus far worked well, which was to put the pig metal in the puddler and melt it there. When the iron is in a molten state the puddler is put in motion and the mass puddled.

Considerable activity is displayed around the Montour Iron and Steel Co.'s works, at Danville, and preparations are being made to resume operations in a short time.

It is stated that representatives of the De Pauw's, of New Albany, Ind., have expressed their willingness to build large glass works at Washington, if they can have sufficient land donated for the purpose.

Topton Furnace, in Berks County, is being slowly repaired.

The large "coke pusher" being built at Scott Foundry for Robert H. Powell, is nearly finished, and temporary sheds have been erected in the yard of the works, under which the machinery is being put together. The coke pusher will be operated by two engines. A blowing engine for the Powell Furnace is also being built at the Scott Works. The sugar mill, composed of castings weighing many tons, is also nearly completed. Two of the 90-inch cotton presses have been shipped, and work on the 80-inch cotton press has been resumed.—*Reading Eagle*.

On Monday of last week the Pittsburgh Steel Casting Co. turned out in 10 hours 62 tons of 2240 pounds of steel blooms, none of them larger than 4 x 4 inches—a big output.

The Pennsylvania Bolt and Nut Works, recently established in Lebanon by Reading parties, went on double turn on Wednesday night, this step having been rendered necessary on account of more orders having been received than can be filled with the present stock on hand.

A fire broke out between 12 and 1 o'clock on the morning of May 17 in the shaft of the Blair Iron and Coal Co., at the opposite end of the P. R. R. tunnel from Galitzon. Three hundred tons of coal in the tipple, machinery, &c., are almost a total loss. The company's loss is probably \$40,000. This will throw 300 men and boys out of employment for at least 60 days. It is presumed the company will put an incline plane up to supply the wants of the shaft. The disaster will seriously embarrass the labor and business interests of Galitzon for some time. The cause of the fire is unknown at present.

MISSOURI.

The Hooker-Colville Steam Pump Co., of St. Louis, have occupied their new building in that city.

The Midland Blast Furnace Co. are about to increase their capital stock from \$150,000 to \$300,000.

The Paddock-Hawley Iron Co. shipped last week 100 blacksmith vises of their manufacture to San Francisco via New York and Cape Horn.

OHIO.

The new works of the Metropolitan Stove Co., of Ashtabula, will be erected and machinery put in this season. A. A. Southwick, of Ashtabula, is secretary and treasurer.

A new Youngstown enterprise is the Novelty Works, for the operation of which a stock company is being formed. They expect to manufacture iron and brass castings of every description, and intend to be ready for business in a few days.

The Briar Hill Iron Co. have leased Ella Furnace, at Sharon, Pa., for such time as it will take to work up 25,000 tons of iron ore. In the meantime the company are fitting up their furnace at Briar Hill.

By satisfactory arrangement, the Cuyahoga Falls wire-mill property passes into the hands of Selah Reeve.

The Spaulding Iron Co., at Brilliant, have succeeded in striking gas after boring to the depth of 1300 feet. This find has been the means of creating a "boom" in boring for gas in the vicinity of Brilliant and Steubenville. The Brilliant Glass Works and the

Jefferson Iron Co. are among those who are reported about to drill.

Lambert Bros., of Ironton, have the contract for 33 new nail machines for the

Total re-serve.....	80,973,100	82,504,000	Inc. 1,630,900
Deposits.....	203,597,100	327,093,500	Inc. 3,495,400
Reserve re-serve.....	75,899,975	76,778,375	Inc. 874,100
Reserve re-serve.....	5,000,000	5,700,000	Inc. 700,000
Reserve re-serve.....	16,088,100	18,151,100	Inc. 87,100

MINING STOCKS.

The closing quotatious for mining stocks were as follows:

	Hd.	Asked.
Annie.....	17	18
Alice.....	3.25	4
Alta. Mont.....	4	4
Alta. & Nor.....	4	4
Belle Isle.....	10	10
Bost. & Del.....	4.25	5
Bodie.....	1.00	125
B. H. & E. N.....	5	5
Bradshaw.....	35	35
Caled. B. H.....	76	100
California.....	24	25
Climax.....	6	9
Con. Imp.....	15	15
Con. Val.....	62	70
Con. Coal.....	23 1/2	23 1/2
Chrysco. Itc.....	1.10	1.10
Central Ariz.....	25	25
Cherokee.....	2	2
Dahlonga.....	4	4
Durango.....	5	7
Decatur.....	5	5
East. Ox.....	20	20
Elko Con.....	13	23
Fly... G. Mine.....	5	5
Gold Stripe.....	8	8
Homestake.....	15 1/2	15 1/2
Hukill.....	6	9
Horn Silver.....	6 1/2	6 1/2
Harlem.....	1.49	1.49
Hibernia.....	4	4
Hortense.....	12	12
Hill-Ander.....	1.25	1.25
Independence.....	20	20
Iron Silver.....	3.00	3.05
Leadville, Con.....	55	60
L. Pitts.....	72	89
L. Chief.....	50	50
Quick-ilver.....	8	8
Ophir.....	3.00	3.00
Maryland Coal.....	12	12
Mexican.....	3.83	3.83
Navajo.....	1.80	1.85
N. Belle.....	5.75	5.75
N. M. Coal.....	14	14
Oil. & Mill.....	1.01 1/2	1.01 1/2
Pipe Line cer.....	6	6
Rappanock.....	82	83
Rootison Con.....	6	6
Red Elephant.....	1.10	1.10
Sierra Grande.....	63	63
Sierra Nevada.....	10	10
Silver King.....	10	11
Shasta.....	6.00	6.00
Suds. Tum.....	20	21
Soupra Con.....	61	64
So. Hite. new.....	10	10
So. Pacific.....	7	7
St. L. & J. & J.....	5	5
Union Con.....	6.53	6.53

GENERAL HARDWARE.

There is little to note this week in regard to the Hardware market. Business goes on quietly, and the amount of goods distributed is quite up to what should be expected. No important changes of prices have taken place.

The demand for Nails has been large during the week, and stocks have become light, though pretty well assort. Considerable inquiries have come from California, as well as other distant points, and the export business is assuming an importance it has not had for some time. Many dealers are refusing orders except from regular customers, and some of them have been in the market to replenish their own stocks. While \$3.10, less 10 cents to the trade, remains the usual price for small lots, much less concession would be made for a large order. The trade are really speculating on the chances of a strike in the West. If this should occur, prices are likely to go up; otherwise there will probably be a reaction.

We call attention to the card, on page 28, of Hussey, Binns & Co., manufacturers of Shovels, Spades and Scoops, Pittsburgh, Pa., who make, and unconditionally warrant, a line of Hammered Solid Cast Steel Shovels and Spades without welds or rivets, and each tool from a single ingot of Cast Steel; also the only Smooth Back Solid Cast Steel Locomotive and Coal Scoops, for which they have letters patent. These grades they sell largely to leading railway and construction companies in this and foreign countries, and their trade is rapidly growing. To meet the wants of all sections, they make a full line of Iron, Steel and Cast Steel Shovels, Spades and Scoops, Mining Shovels, &c., of all grades and descriptions. Durrie & McCarty, No. 97 Chambers street, are the New York agents, and will furnish catalogues and prices on application.

On the 16th inst. the following prices for Cordage were adopted, being a reduction of half a cent per pound. They are subject to the usual discount to the trade of 1 cent per pound:

Manila Cordage, sizes above 12 th'd and Hay and Hide Rope.....	15
" 12 th'd and 9 th'd (3 in diam.).....	15 1/2
" 6 th'd and 9 th'd (3 in diam.) and 5-16 in. diam.).....	16
Manila Cordage, bold rope yarns.....	16 1/2
Manila Whale Lines.....	17
Tarred Manila.....	17
Fine Tarred Manila Lath Yarn.....	15 1/2
Sisal Rope, sizes above 12 th'd and Hay and Hide Rope.....	11
" 12 th'd (3 in diam.) and 6 th'd and 9 th'd (3 in and 5-16 in. diam.).....	12
Tarred Sisal Lath Yarn, Coarse or Medium.....	10 1/2
" Fine.....	11 1/2

The American Table Cutlery Manufacturers' Association held its regular meeting at Springfield, Mass., on the 14th inst., and dissolved. On the 18th inst. the following manufacturers,

American Cutlery Co.,
Frary Cutlery Co.,
Lamson & Goodnow Mfg. Co.,
Landers, Frary & Clark,
Meriden Cutlery Co.,
John Russell Cutlery Co.,
met at Springfield and formed an organization known as the "Association of Table Cutlery Manufacturers," at which meeting prices were fixed for fall season.

Henry Disston & Sons request us to publish the following caution to the trade:

CAUTION.

The deserved popularity achieved by our No. 7 Hand Saw has induced some of our

competitors again to put into the market a saw having our designated No. 7 stamped on the blade, which, at times, misleads the trade when ordering by numbers only. We advise them in ordering our Saws hereafter to ask for Henry Disston & Sons' No. 7 Hand Saws. All Saws of our brand are fully warranted, and if one should prove defective in any particular, a new one will be given for it. HENRY DISSTON & SONS.

Alfred Field & Co., on behalf of Eley Bros., of London, publish among our "Special Notices" a denial of the charge of the adulteration of English Caps, so far as the goods made by them are concerned.

For the convenience of their Eastern customers, the Harrington & King Perforating Co., of Chicago, have opened a branch office at No. 100 Beekman street, New York, under the charge of J. H. Drake as manager.

E. Bissell & Co., auctioneers, will sell next Tuesday a large lot of Hardware, including 5000 dozen Table Knives and Forks, Carvers, &c. See advertisement among "Special Notices."

IRON.

American Pig.—We can report no improvement in the Iron market, which continues in as depressed a condition as has characterized it for some time. The feeling seems to be general among both sellers and buyers that lower prices must prevail, and, naturally, purchases are restricted to the smallest possible quantities. Quotations are to a very large extent nominal, most of the Iron sold being at lower rates. The Thomas Iron Co. report the sale of 2000 tons Gray Forge at Hoboken at \$10.25. This company have decided to put out two more furnaces, making, with the one blown out early in this month, in all three out of blast. We note a sale of good Neutral Gray Forge at \$17.50 at tidewater. We quote, nominally, for standard brands: Foundry No. 1, \$21.50 @ \$22; Foundry No. 2, \$19 @ \$20; Gray Forge, \$18 @ \$19.50.

Scotch Pig.—A small, steady business is doing in Scotch Pig, at unchanged prices, to supply foundrymen with such mixtures as they need in quantities to meet their immediate needs. The condition of the market here is not such as to encourage shipments, and arrivals are well within the demands of the trade. We quote: Eglington, \$21.25 from ship; \$22 from yard; Carnbroe, \$23 from yard; Glengarnock, \$22.50 @ \$23 from ship and yard; Dalmellington, \$21.50 @ \$22 from ship; Summerlee, \$24 from ship; Cottles, \$24.50 @ 24.75 from ship; Gartsherrie, \$25 from yard; Langloan, \$24.50 from ship.

Old Rails.—What little change there is in the Old Rail market is in the direction of weakness. We note sale of 600 tons on private terms. We quote, as before, \$22 @ \$23 for T's, to arrive and on the spot.

Steel Rails.—We hear of a good many inquiries, but no important sales, mills being filled up until well into the fall. We quote, without change, \$38 at works.

Bar Iron.—The apathy of the past few weeks continues to be the only conspicuous point in the Bar Iron trade. With the exception of the demand from building sources, there is little doing. Consumers are refusing to buy beyond their present wants, and are ordering in small lots only such sizes and qualities as they need for immediate use. Prices are weak and irregular, and will likely continue so until the future is more clearly defined. The present indications of a strike in the Western mills about the first of the month have a tendency to improve the market and strengthen prices. Western manufacturers are not making any great effort to sell for delivery before the 1st, and decline all orders tendered for delivery after that date. They quote Refined Iron from the mills at \$2.10 @ \$2.25, but we hear of sales as low as \$1.95, 2% off for cash, which is considered less than the cost of production for the grade of Iron sold. From store Refined Iron is quoted at \$2.30 @ \$2.40 and Common at \$2.10 @ \$2.20.

Scrap Iron.—Transactions in Old Iron are very scarce, and quotations are to a great extent nominal. Dealers complain that there are no offerings and no buyers for stock on hand. Selected Yard is held at \$25 @ \$26, ex-store at \$24.50, ex-ship at \$23.50 and Crop Ends at \$23.50 @ \$24.

Metals.—There is a decidedly better feeling noticeable in the Copper market, without, so far, leading to greater activity, sales being restricted for the week to 300,000 lb. We quote Lake 15¢, and other brands 14 1/2¢ @ 15 1/2¢. London cabled last Friday Chili Bars £1 better, but since then the advance was lost again, for they came £6.10 yesterday. Best Selected being quoted at £6.10. This afternoon we are cabled as under: "Market is a little firmer. Best Selected, £6.7. 10/ @ £6.8. 10/ and Chili Bars, £6.2. 5/ @ £6.2. 15/." Messrs. W. T. Sargent & Son, London, May 5, say: "Market has gradually declined about £2. 10/ @ £2. ton, after rallying in the meantime some 15/ 1/2 ton. The closing value of Chili Bars is £6.2 1/2 ton. The consumption of Copper is large and still increasing. Notwithstanding a drooping market for the first four months of this year, which has had a decided influence in preventing smelters and other large consumers from buying freely, the deliveries of England and France combined, from January 1st to April 30th, this year, are returned as 25,387 tons, against 24,408 tons same time last year. As regards production, there appears to be no material change, slight increases in some directions being about balanced by decreases in others—a statement that is proved by the present European reserves

showing a steady decline, and being the smallest held for many years. It is believed in some quarters that American production is largely on the increase. It is probably correct that American Regulus and Raw Copper that has hitherto been refined and used in America may find its way to this country to be refined." Manufacturers may be quoted as under (asking prices): Buttons, 29¢ @ 30¢; Braziers, 28¢ @ 34¢; Circles, 31¢ @ 34¢; Sheathing, 26¢; and Bolt Copper, 28¢; Segment Sheets, 31¢; Fire-Box do., 28¢. These rates, we presume, may still be considerably shaded.

Tin.—Our market has developed additional strength during the week, but the dealings are moderate in extent. We quote Straits, large lines, to-day, 21 1/2¢, London coming £9.10/ last night, while this afternoon we are wired from there to the following effect: "Tin is a little steadier. Straits Ingots, spot, £9.10/ @ £9.7, and futures, £9.10/ @ £9.8." Lamb and Flag we quote 22 1/2¢ @ 22 1/2¢. During the first four months of the year the Straits and Australia jointly shipped to the United States and Europe 9000 tons of Tin, against 7452 in 1882, 6141 in 1881, and 6650 in 1880. Messrs. William I. Russell & Co., No. 12 Cliff street, New York, and Great Western Disp. Co. have decided to put out two more furnaces, making, with the one blown out early in this month, in all three out of blast. We note a sale of good Neutral Gray Forge at \$17.50 at tidewater. We quote, nominally, for standard brands: Foundry No. 1, \$21.50 @ \$22; Foundry No. 2, \$19 @ \$20; Gray Forge, \$18 @ \$19.50.

Lead.—Some 300 to 400 tons sold during the week at \$4.40. The market is not very strong, in view of the fact that St. Louis is down to 4¢ with Hard Lead, and that the cut freight rate this way is only 30¢. Refined Lead is worth at St. Louis 4 1/2¢, and here not much better than Common. From London we are cabled this afternoon: "Market weak; Common English Pig, £1.3. 2/6 @ £1.3. 7/6." Manufacturers are quoted as follows: Lead Pipe, 6 1/4¢; Sheet Lead, 7 1/2¢; Tin-lined Lead Pipe, 15¢ lb. and Block-tin Pipe, 45¢, less the usual discount to dealers.

Selter and Zinc.—Common Domestic Selter remains inactive at \$4.70 @ \$4.75, and Silesian nominally at 5 1/2¢. We quote Bertha Refined, 7 3/4¢ @ 8¢, and Bergenport 9 1/2¢. Sheet Zinc is quiet at 6 1/2¢. Import into the United States first nine months of fiscal year, 13,968,667 lb. Selter, against 13,575,014 during the corresponding previous period, and 2,512,699 lb Sheet Zinc, against 2,494,695. From London we receive to-day the ensuing cablegram: "Selter is unchanged. Ordinary, £1.4. 17/6 @ £1.5. 2/6 at shipping ports." Antimony.—The market is flat at \$9.70 for Hallett and \$10.70 for Cookson.

COAL.

Anthracite Coal continues without perceptible improvement. Nevertheless, the amount of business in progress is large, and fair for this season of the year, but is less active than one year ago. The agreement is for half-time at the mines this week and whole time next week, beyond which there is nothing definite. The leading companies all claim to be selling very nearly at circular prices, but there are many of the "go-as-you-please" class who cut below.

The Accountant of the Anthracite Coal Combination has prepared the following statement showing the general distribution of the entire production of Anthracite Coal in 1882:

To Pennsylvania, New York and New Jersey..... 10,557,780
To New England States..... 5,064,775
To Sonoma, Oregon, including Delaware and Maryland and the District of Columbia..... 1,168,730
To the Pacific States..... 6,875
To the Dominion of Canada..... 49,735
To foreign ports.....

Total..... 29,120,076

The production of Anthracite Coal last month was 2,511,709 tons, an increase of 375,907 tons, as compared with the corresponding month last year, and for the four months this year, 8,900,961 tons, an increase of 1,224,245 tons, as compared with the corresponding period last year.

Bituminous is as dull as ever, and Cumberland is quoted about \$4.60 alongside in New York.

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	lb.	12 1/2	13

Clocks.....	25	2,668
Chains and anchors.....	12	738
Cutlery.....	60	31,460
Guns.....	60	16,370
Hardware.....	8	1,375
Iron, pig, tons.....	1,788	35,447
Iron, sheet, tons.....	47	2,338
Iron ore, tons.....	2,765	9,545
Iron, other, tons.....	1,080	39,045
Machinery.....	212	15,068
Metal goods.....	266	21,353
Nails.....	153	1,027
Needles.....	16	6,174
Old metal.....	—	9,443
Platinum.....	3	2,654
Platesware.....	39	4,056
Pins.....	4	676
Quicksilver.....	600	16,981
Saddlery.....	92	3,189
Steel.....	69,547	130,707
Silverware.....	5	297
Tin, bxs.....	82,423	101,9
Tin, 1,528 slabs, 113,595 lbs.....	22,458	22,458
Wire.....	1,784	22,516
Zinc oxide.....	480	4,809

The quantities of leading articles imported compare with previous dates as follows:

For the 20 weeks Same week of 1882, time 1882.		
Cutlery, pkgs.....	89	2,786
Hardware, pkgs.....	8	616
Iron, R. R. bars.....	—	78,841
Lead, pigs.....	3,031	16,544
Steel, pkgs.....	69,547	1,510,520
Tin, bxs.....	82,423	638,164
Tin slabs, lbs.....	113,595	7,934,720

EXPORTS OF SPECIE.

For the week ended May 19:

Total.....	\$48,395
Previously reported.....	5,084,012
Total since January 1, 1883.....	\$6,034,407
Same time in 1882.....	25,740,297
Same time in 1881.....	4,656,083
Same time in 1880.....	3,472,077
Same time in 1879.....	3,472,077
Same time in 1878.....	7,934,720
Same time in 1877.....	14,707,274
Same time in 1876.....	24,190,077
Same time in 1875.....	33,474,34
Same time in 1874.....	34,099,78
Same time in 1873.....	90,304,827
Same time in 1872.....	22,458,197

EXPORTS EXCLUSIVE OF SPECIE.

For the week ended May 23:

Total.....	1881.	1882.	1883.
Reported.....	\$7,077,845	\$4,945,706	6,373,789

Since Jan. 1. \$147,326,913 \$123,100,525 \$138,814,510

PHILADELPHIA.

(By Telegraph to The Iron Age.)

PHILADELPHIA, May 23, 1883.—Sales of 2000 tons Spiegleisen have been made to-day at \$31.50, Philadelphia and Baltimore shipments.

Office of The Iron Age, 220 South Fourth St., t.

PHILADELPHIA, May 23, 1883.

Pig Iron.—The market still has a very unsettled appearance, with a gradual tendency toward lower figures. The amount of business done during the week has not been large, although sellers are extremely urgent, and in many cases willing to make concessions when such a course seems likely to secure a purchaser. Nominally quotations are unchanged at from \$20 to \$21.50 at furnace for No. 1 Foundry, and \$18 @ \$19 for No. 2, but business is extremely slow, and orders hard to get in lots of more than 200 to 300 tons at a time, a large proportion of the sales being still smaller quantities. The impression that prices will be lower seems to gain ground, so that consumers are buying only enough to cover immediate requirements. There is so much irregularity in prices, however, that it is difficult to quote with anything like accuracy. Some brands command \$21.50 at furnace; others are offered at \$21.50 delivered, with a certainty that bids at a still lower figure would be accepted. Prices are determined in most cases by the quantity and character of brand required, and in others on the necessity for realizing and the promptness of settlement. No. 2 Foundry Iron is particularly dull, and, with heavy accumulations at furnaces, prices are more irregular and weaker in proportion than almost any other descriptions. It is reported that some of the leading companies are considering the propriety of making another cut in prices, owing to the fact that quotations recently announced are being shaded by numerous smaller concerns. It is supposed that it is the intention to crowd the weaker companies out of the market, and by that means reduce the supply, but, however that may be, it is certain that prices are being cut, and chiefly by the class above referred to. Mill Irons are comparatively steady at \$18 @ \$19 at furnace for standard to choice brands. The demand keeps pretty well up to the supply, so that at the moment there is not much prospect for lower prices, particularly for favorite brands. Outside lots are very irregular, however, and it is difficult to find a market at any reasonable price, although at \$17 @ \$17.50 a good deal of fair Iron could be bought, and from that price downward, according to the desire to realize. Price appears to have very little influence upon demand at present. If buyers need to replenish stocks, they take as little as possible, and lowering the price does not increase the order in the least. How long this will continue cannot be foretold. Some parties think that a strike in the West will lead to an increase in the local demand for Mill Irons, but in the meantime there is a disposition to await the course of events. Taking all the facts into consideration, the chances are that there will be very little change in either direction, as regards standard brands, while others may go still lower before buyers can be induced to take hold.

Scrap Iron.—Market extremely dull at \$23 @ \$23.50 for Foreign, and \$25 @ \$26 for Choice Selected.

Nails.—Are in active request, and we hear of several inquiries for large lots, but there appears to be little disposition to book such orders, unless for prompt shipment, as the market at the moment is somewhat uncertain, owing to the labor trouble West. The feeling may be said to be somewhat firmer. We quote \$3.15 $\frac{1}{2}$ keg in ordinary lots.

PITTSBURGH.

(By Telegraph to The Iron Age.)

PITTSBURGH, May 23, 1883.

Seventeen hundred tons of Marshall Pig Iron were sold at auction yesterday. Bidding was lively, but the prices realized were below market rates. Eighty-four tons Wheeling No. 1 sold at \$17.25; 83 tons Cleveland Gray Forge and Inferior Iron, at \$14; 91 tons Isabella No. 2, at \$17.25; 245 tons Lemont No. 1, in two lots, at \$16 and \$16.25; 16 tons Bowery No. 1, at \$18.50; 148 tons Oliphant Gray Forge, at \$16.50; 75 tons Lemont Gray Forge, in two lots, at \$16 and \$16.12 $\frac{1}{2}$; 136 tons Marshall Brothers' Gray Forge, at \$17.12 $\frac{1}{2}$. These prices are \$1 @ \$2 below the market rates.

The ironworkers have presented the scale to a number of the manufacturers for signature, but so far it has been refused by all iron manufacturers. Some steel works have signed it.

Old Rails.—The market is exceedingly dull and prices very irregular. Good makes sell at about the following quotations, viz.: Charcoal Blooms, \$59.50 @ \$61; Run-out Anthracite, \$50 @ \$52.50; Scrap Blooms, \$45 @ \$46.50; Northern Ore Blooms, \$43 @ \$44.50.

Muck Bars.—Market quiet, but prices are steady at \$34 @ \$35, the majority of sales being at medium quotations.

Bar Iron.—The demand has been fairly active during the week, and the market shows a slight tendency toward steadier prices. There has been a good deal of Iron

there will be a lockout next month, for a longer or shorter period, seems almost certain. Both the mill owners and the ironworkers have placed themselves in such

offered at about 2.16 @ 2.15, delivered, by country mills, but buyers have not taken hold with much freedom, giving the preference to city Iron at 2.26 @ 2.25, particularly when quality has been of essential importance. At the monthly meeting of manufacturers, held yesterday, the opinion seemed to prevail that the position was improving, and that it was inexpedient to make any change in quotations. The card rate therefore remains at 2.37 @ 2.36 for a basic for labor, and the selling price at 2.26 @ 2.25, with a reasonable probability that the market can be held at these figures during the summer months. No very large orders have been offered, but the demand for small lots appears to be sufficient to keep the mills steadily employed; hence the reaffirmation of former quotations.

Plate and Tank Iron.—The market has somewhat of an uneven appearance, but, on the whole, shows improvement, as compared with the past two or three weeks. There is more inquiry, and, if orders follow in proportion, the mills will be in a position to hold prices steady, even if there is no advance. Several good-sized orders are on the market, but whether they will be placed or not will probably depend a good deal on the course of events in Pittsburgh. It is too soon to assume that business is on the point of improvement, as inquiries may have been made in anticipation of a suspension of work in the Western part of the State. However that may be, the feeling is better than it has been, and, although very low prices have been named in special cases, there is more firmness as a rule, and prices are steady, as follows, viz.: Bridge Plate, Tank Iron, &c., 2.46; Shell, 3.15 @ 3.25; Flange, 4.15 @ 4.25; and Fire-Box, 5 @ 5.50.

Structural Iron.—There has been a fair amount of business closed during the week, and manufacturers are feeling more hopeful than they have done for some time. Besides a fair demand for small lots, about 2000 tons bridge orders have been taken for such roads as the N. Y., L. E. and W., the C. C. and I., and others, west of the Mississippi. Prices have been crowded down pretty low for Angles and Plates, but, having secured valuable orders, there is a disposition to stiffen up again, and for small lots prices are steady, as follows: Angles, 2.36 @ 2.46; Tees, 3.26, and Beams and Channels, 3.50.

Sheet Iron.—The demand has shown considerable improvement, and quite a number of good size orders have been placed. Many of the large dealers have made contracts for summer and fall delivery, and although prices have not been altogether satisfactory to manufacturers, there is a general impression that bottom has been reached, and gradual improvement is hoped for as the season advances. Small lots may be quoted as follows:

Common Sheets, No. 28..... 4.50
Common Sheets, Nos. 26 and 27..... 4.50
Common Sheets, No. 24 to 25..... 4.50
Common Sheets, No. 18 to 20..... 3.50
Best Refined, $\frac{1}{2}$ advance on the above.
Best Bloom Sheets, No. 26 to 28..... 6.10
Best Bloom Sheets, No. 22 to 25..... 6.10
Best Bloom Sheets, No. 16 to 21..... 6.10
Common Red Plates, 3-16 to 16..... 3.50
Best Bloom, Galvanized, discount..... 40 @ 50
Second quality, discount..... 50 @ 50

Wrought Iron Pipe.—The demand has not been quite up to that of last week, but prices are continued as before, say 57 $\frac{1}{2}$ @ 60 % discount on Boiler Tubes, and 70 % for Gas and Steam Pipes, with extra discounts on special sizes.

Steel Rails.—There is more inquiry for Rails, one or two being for lots of 10,000 tons each, but the amount of business closed has not been very large. The demand is for summer delivery, and as the mills are already pretty well filled up with work, they are indifferent about entering more at the low prices at which buyers expect to place their orders. Concessions could be had for winter work, but there is very little demand other than for deliveries inside of four to six months. Sales have been made on the basis of \$38 @ \$39 at mill for Heavy Rails, with the usual advance on Light Sections.

Old Rails.—Small lots, spot delivery, would command \$23.50 @ \$24, but for July there are sellers at \$31 less, with \$21.50 as about the best offer that can be had. The market is weak, with a probability that concessions will have to be made before buyers can be induced to take hold.

Scrap Iron.—Market extremely dull at \$23 @ \$23.50 for Foreign, and \$25 @ \$26 for Choice Selected.

Nails.—Are in active request, and we hear of several inquiries for large lots, but there appears to be little disposition to book such orders, unless for prompt shipment, as the market at the moment is somewhat uncertain, owing to the labor trouble West. The feeling may be said to be somewhat firmer. We quote \$3.15 $\frac{1}{2}$ keg in ordinary lots.

PITTSBURGH.

(By Telegraph to The Iron Age.)

PITTSBURGH, May 23, 1883.

There will be a lockout next month, for a longer or shorter period, seems almost certain. Both the mill owners and the ironworkers have placed themselves in such

a position that there is scarcely a chance for a compromise, although it is still possible. It is suggested, as a way out of the present dilemma, that the mill owners renew the present scale and then shut down for a couple of months, or longer if deemed necessary; but it is certain they will not do this—they want a reduction in the price of labor and will be satisfied with nothing less. It is worthy of note that there are several Iron mills having non-union workers. Whether the non-union men will submit to a reduction or not remains to be seen. If they do and there is a lockout, it will give the non-union a decided advantage over the union mills, and it would afford a strong temptation for some of the latter to fall into the non-union ranks.

Ore.—The Ore market continues exceedingly dull, with but little prospect of any immediate change for the better. As Pig Iron furnaces are still blowing out, the consumption of Ore is steadily decreasing, and the Ore companies will have to follow the example of the furnaces and cut down production. The receipts of Lake Ore here have almost entirely ceased.

Pig Iron.—There has been very little change in the situation since our last report. Business continues dull, demand is of a hand-to-mouth character, and prices weak and irregular. Mill owners, in view of a probable lockout the first of next month, are buying very sparingly, and sellers, realizing that it is useless to do so, are making very little effort to sell. There is to be a sale of 1500 tons of the Marshall Iron this afternoon at public auction, but at too late an hour to give the result in this report. This sale is regarded with a good deal of interest in Iron circles, as the prices realized will be of some extent a market value for the rest of this Iron—some 55,000 to 58,000 tons. Prices are nominally the same as a week ago:

No. 1 Foundry..... \$21.00 @ 22.00, 4 mos.
No. 2 "..... 19.00 @ 20.00, 4 "

Neutral Gray Forge..... 18.00 @ 18.50, 4 "

Bessemer..... 21.00 @ 22.00, 4 "

Cold-Blast Charcoal..... 28.00 @ 33.00, 4 "

The regular monthly meeting of the Western Pig Iron Association took place last Wednesday, but there was nothing important developed excepting that stocks were reported smaller.

Muck Bar.—In the absence of sales we continue to quote, nominally, at \$34 @ \$35, 4 mos. There does not appear to be much inquiry, and, so far as we can learn, very little offering.

Manufactured Iron.—The fear of a lockout has, as might be expected, stimulated the demand. Some mills, having all the orders booked they can execute, are declining new ones, and all are refusing to sell for delivery beyond this month. The increased demand may be attributed almost wholly to apprehensions of a stoppage of the mills next month, so that in reality there has been no real improvement in the situation. There are those who think that, lockout or no lockout, the mills should stop for a couple of months. Prices are still quoted on a basis of 26 @ 2.16 for Bars for assorted orders.

Nails.—There is a continued good demand; manufacturers have all they can do, and some of them are refusing to take

Ref. Bar Iron, 1 to 6 x 3/8 to 1, 3/8	25/6	25/6	25/6
" 4 to 6 x 1 1/2 to 1, 3/8	25/6	25/6	25/6
" 4 to 2, Round and Square	25/6	25/6	25/6
Hoop Iron, 1/2 wide and upward	32/10	32/10	32/10
Band Iron, from 1/2 to 5 in. wide	27/10	27/10	27/10
Horse shoe Iron	32/6	32/6	32/6
Norway Nail Rods	52/6	52/6	52/6
Black Diamond Cast Steel	12/6	12/6	12/6
Machining Steel	12/6	12/6	12/6
Spring Steel	12/6	12/6	12/6
Common Horse Nails	10/6	10/6	10/6
Railroad Spikes, 1/2 x 9-in.	32/10	32/10	32/10
Perkins' Horse Shoes, 3/8 kg of 10 lb	84 37/2	84 37/2	84 37/2
" Mule Shoes	52/6	52/6	52/6

RICHMOND.

ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of May 21, 1883: This market is not consuming as much Pig and Manufactured Iron as the early spring indications promised. The quotations below would be reduced for large orders:

No. 1 Scotch Pig Iron	24.00 @ 26.50
No. 1 Anthracite Pig Iron	23.75 @ 25.75
No. 2 " " " 23.75 @ 23.25	23.75 @ 23.25
No. 1 Virginia Coke Pig Iron	21.75 @ 23.75
No. 2 " " " 20.75 @ 21.75	20.75 @ 21.75
No. 3 " " " 19.25 @ 21.25	19.25 @ 21.25
White and Mottled	17.75 @ 19.75
Virginia C. B. Charcoal	17.75 @ 19.00
Old Dom. Nails (carload lots)	3.00 @ 2.50
Old Rails	2.00 @ 2.00
Old Spikes	1.90 @ 2.20
Wrought Scrap, No. 1	20.00 @ 21.00
Cast Scrap, No. 1	18.00 @ 19.00
Richmond Refined Bar Iron	2 2/10
Horse Shoes (Tredegar)	4.50 @ 5.00
Mule	5.50 @ 6.00

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENGL., May 7, 1883.

THE SITUATION

is very much the same as when I last wrote on your behalf. In the open markets there is scarcely any life and the spirit of speculation seems to be dead. Money is forthcoming in abundance for any enterprise which is seen to be worthy of support, but investors fight shy of venturesome undertakings, whether floated on the Stock Exchange or put forth in other directions. Loans can be obtained by the corporations of towns and by public bodies generally at 4 per cent., and the 3 per cent. Consols (Government stocks) stand at 102 over £100. Under such circumstances it is not a little curious that speculation should be so entirely wanting in general matters. As a rule, it has been noticed that when money is abundant and the rate of interest proportionately low, there is a decided tendency for moneyed persons to "try the lucky bag" of speculation. The prime conditions obtain just now, but the sequence is wanting—for what reason I do not profess to be able to state. Much wiser persons than your humble servant are equally nonplussed by the situation. Some of them are disposed to think that what Mr. Goschen styles "the appreciation of gold" may have something to do with it. Mr. Goschen points that the production of gold has been greatly on the decrease during the past 10 years, while at the same time vast amounts of the metal have been absorbed by Germany and other nations for circulation purposes. He concludes, therefore, that the purchasing power of a given gold coin—say a sovereign, a napoleon, a 20-mark piece and an eagle—is now appreciably greater than it was prior to the period of which he speaks, say 10 or 12 years ago. The problem is confessedly an intricate and difficult one, yet if gold to the value of £200,000,000 (say \$1,000,000,000) has been absorbed in supplying the United States, Germany and Italy with their new gold coinage, while concurrently the annual yield of the world's gold mines has fallen from £30,000,000 in 1851 to below £20,000,000 now, the idea of Mr. Goschen is feasible. Especially is this likely to be the case when it is remembered that the requirements of our circulation—the work it has to perform—have at the same time been growing with remarkable rapidity. The net outcome is that prices have fallen, and the standard of values has been lowered in almost all kinds of products and commodities. His view is in substantial accord with what I have on more than one occasion urged as being a certainty in connection with iron, steel and metals generally. For various reasons we have progressed so rapidly that no reliable comparison can be instituted between the values of to-day and of a few years ago. Looked at from this standpoint, it follows that iron at, say, \$35 to-day is as valuable and as *profitable* as when it stood at \$40 a few years back. There may, and must be, exceptions to this rule, but for the purposes of argument and illustration I think it may be assumed that although most all kinds of goods have gradually declined in their nominal prices, yet the world is no poorer by reason of such declination, but is the richer rather than the contrary. It would seem to follow, therefore, that unless there should be new discoveries of gold we may look for a continued low range of values—occasionally varied, perhaps, by abnormal occurrences, but, on the whole, a much lower limit than that of the last two decades.

THE IRON MARKET

is dull in all directions, with scarcely any variations in prices worthy of special note. Crude irons are almost stationary and have a slow demand, although there is a good deal of iron being delivered on running contracts. At Glasgow warrants are a little better under the influence of buying by certain of the brokers to cover their earlier bargains. The public still refrain from touching warrants; consequently the brokers are not doing big things. Scotch brands of pig iron are nominally about the same, but they are to be had at lower prices, particularly the brands most affected by the renewed competition of Middlesbrough's pig iron, which is being sent into Scotland much more freely now than for a long time past. At Middlesbrough's prices are unchanged on the basis of 40/6 to 40/3 for No. 3, but it is believed that the reports of transactions at 39/6 @ 39/9 are well founded. The ironmasters' returns for April show that the shipments during that month were much larger, and that the reserved

stocks decreased to an considerable extent, yet neither circumstance has had any appreciable effect upon prices. In the same way the resolution of the West Coast smelters to considerably restrict the output of hematite pigs has not in any respect stimulated the market or hardened values. Consumers evidently have not the slightest fear of the occurrence of events unfavorable to them, but rather anticipate that they may await developments with the utmost confidence. The observation holds good in respect of all the other iron-making districts, and as regards almost all grades of crude and finished iron. The prevalent policy is one of buying no more than is necessary for the wants of the time being, leaving the future to take care of itself. Ordinary sorts of finished iron are exactly as of late in point of open quotations, but it is unquestionable that underselling is in vogue in all directions. Buyers with cash, and orders of respectable proportions, may almost command their own terms for other than the best brands. Market bars still stand at 27/10, but excellent unmarked iron is to be had at 27/10, and ordinary assortments of Welsh bars are on sale at £5. 7/6 per ton. Other classes of iron are equally variable, and it is virtually impossible at the moment to mention a price (above £5. 10/1) which will not buy any class of iron—of a sort. Merchants and other buyers are naturally well content with this state of things, and in not a few instances are placing orders rather freely at absolute bottom rates. It is understood that there are still sundry American inquiries in the market for different kinds of iron, but I am unable to gather that orders of any size have actually been placed.

The news, just received here by cable, that your ironworkers intend to fight out the wages question, is regarded as being a serious matter. We are told that the Pittsburgh ironmasters have refused to book orders for deliveries after May 1, and that 100,000 ironworkers are coming out on strike in opposition to the reduction of wages proposed by their employers. In the absence of more definite information, it is impossible, of course, to infer the probable effects of the dispute, but in some rather sanguine minds here it is held that the broad result of the *lapsus* will be to send over many orders to this country. Less eager persons admit this possibility, but wisely suggest that it is by no means certain that a single additional order will come here under the circumstances. In any case, further news will be awaited with much impatience, for the cessation from labor of 100,000 ironworkers in any part of the world must needs be an event of grave importance to the similar industries of this country. In iron there is no movement, and prices are purely nominal at £5 and upward 2 1/2 ton. Old rails are inquired after, but are relatively scarce, and are steadily held by the railways. For old D. H. the running quotations are 68/ @ 70/ 2 1/2 ton, f.o.b. for net cash, with about 75/ offered by your buyers, c.i.f. New York. Heavy wrought scrap is neglected, at about 57/6 @ 60/ f.o.b. London or outports. Old scrap leaf-spring steel is called 87/6 @ 90/ 2 1/2 ton, and is in fair request. In Bessemer bloom very little indeed is being done. Steel rails are dull and flat, at £4. 15/ upward for ordinary heavy flange sections, but I think American buyers could get suited at \$40/ @ 70/ 2 1/2 ton, f.o.b. for net cash, with about 75/ offered by your buyers, c.i.f. New York. 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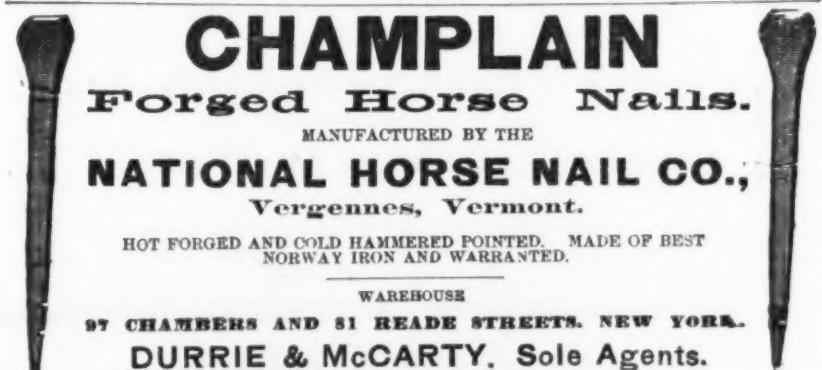
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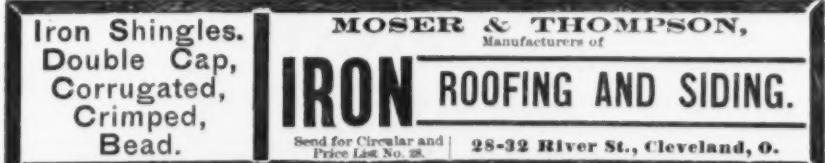
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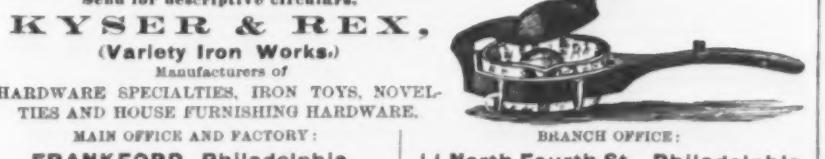
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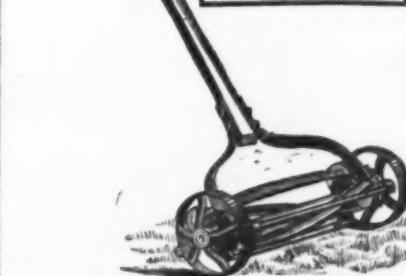
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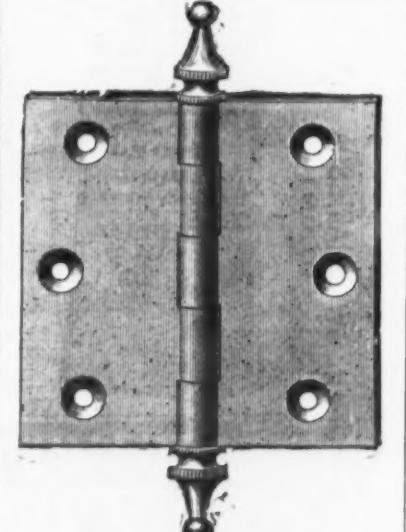
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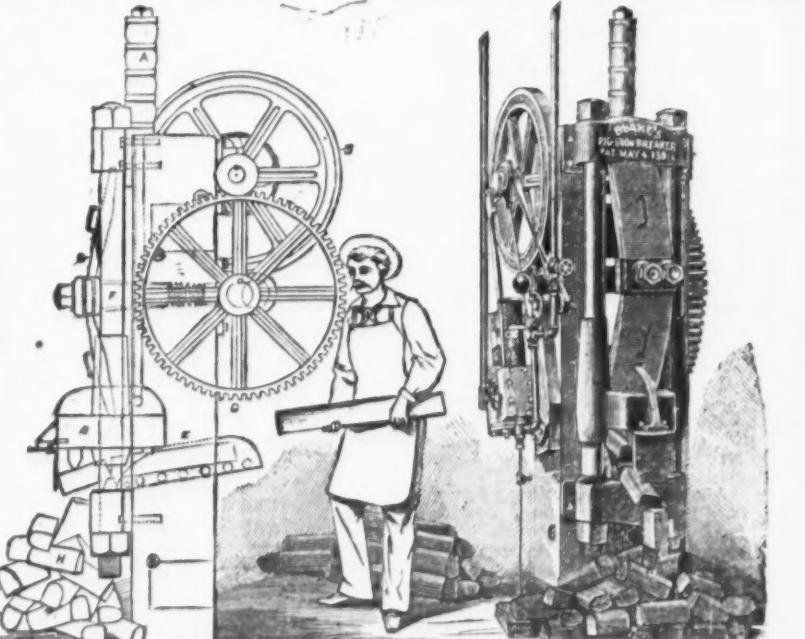
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WASHINGTON LETTER.

(From Our Own Correspondent.)

WASHINGTON, D. C., May 23, 1883.

Senator Beck passed through the city a few days ago, and, in reply to an inquiry as to his letter on the tariff question, said that it would be ready shortly and be a complete defense of the position of the Democratic party in favor of the most liberal construction of the tariff from the standpoint of tariff for revenue only. The Senator sustains the extreme views of the recent Kentucky convention on tariff matters, and pronounces its resolutions the keynote of the Democratic campaign of 1884. He fully coincides with the Wattersonean ideas on that subject, and will use all his influence to secure the election of a Speaker and the nomination of a President committed to those views. The ultra ring, represented by such men as Beck, Watters, Morrison, Springer, and many others, is absolutely irreconcilable on the tariff, and from present indications there will be considerable commotion in the camp before it is disposed of.

TARIFF ONLY FOR REVENUE.

The proposition of Governor Butler to substitute "tariff only for revenue" for "tariff for revenue only" is looked upon in political circles here as one of those neat pieces of demagogism for which the versatile Governor of the old Bay State is somewhat notorious. The two propositions show a distinction with very little difference. It is not likely that the people will be snared by that sort of chaff, but it would still be as well for them to keep their eyes open or they may find themselves in the meshes before they know it. It is claimed for the new-fangled doctrine of "tariff only for revenue" that it recognizes a certain degree of protection. The answer among public men here is, Then why not call it by its right name, or a "tariff for the protection of American manufactures and labor?" This specimen of Butlerism is looked upon as the merest subterfuge.

A NATIONAL FOUNDRY.

Since the question of establishing a national foundry has been mentioned there has been a perfect avalanche of suggestions, epistolary and oral, received at the department in favor of divers localities. The statement accredited to a member of the Naval Board, that his colleagues were surprised at the recent failure of the Pittsburgh steel manufacturers to make steel guns that were acceptable to the naval officers, has naturally caused no small degree of excitement in iron and steel circles. The statement is also accredited to one of the board that "we had expected that Pittsburgh could not be outdone in this line, but were disappointed. Boston men lead the Pittsburghers. They made some magnificent guns." This is regarded as a bid for Boston. The fact of the Secretary of the Navy hailing from that section seems to encourage that idea. For the purpose of casting the proposed steel guns it would naturally be supposed that localities most largely interested in steel manufacture would be preferred. The subject will doubtless lead to a great deal of agitation before it is finally disposed of.

REDUCTIONS IN THE TARIFF OF VENEZUELA.
The Department of State is in receipt of the Executive decree of January 26, 1883, removing the import duty of 30 per cent. upon goods introduced into Venezuela by way of the Antilles. The following is an official translation of the text:

Article 1. The products, goods and merchandise exported from Europe and the United States to Venezuela, and accompanied with all the documents required by the customs laws, may be transshipped in foreign colonies from one vessel to another to proceed to their destination, and will be considered as arriving directly from the original points of export.

Article 2. When, by lack of immediate transport, it may become necessary to disembark the said products, goods and merchandise in foreign colonies, they may be reembarked for Venezuela without being considered as Colonial exports, always provided that, in addition to the consular documents from the port of original dispatch, the owners or consignees present at the custom-house of the Republic where the goods are landed a certificate from the Venezuelan consul in the Colony asserting that the said goods were only there on deposit for lack of vessels to take them to their destination.

Article 3. The provisions of the foregoing articles will take effect from the 15th of February next in all the custom-houses of the Republic.

Sunday Railway Work.

According to the *Railway Age*, of Chicago, Col. Bennett H. Young, president of the Louisville, New Albany and Chicago Railroad, has issued an order that, so far as possible, no work shall be done or trains be run on the road on the Sabbath day. Passenger trains only will be run for carrying mails, and efforts will be made to arrange for their discontinuance. In cases of perishable goods or live stock, freight trains will run when necessary only. The order further says: "You will in future run no excursion trains of any kind for any purpose during the Sabbath. This order applies to camp-meeting trains. If the Christian people cannot find other places for worship, this company will not violate divine and civil law and deny its employees the essential rest of the Sabbath to carry them to the camp-meeting ground. I am also informed that a number of the company's employees have conscientious scruples against any work on the Sabbath day. There are likely others who do not feel so strongly on this subject. Under no ordinary circumstances must any employee who objects on the ground of his religious convictions be ordered or required to do any service Sundays. If any difficulties arise in the execution of this regulation you will please report them to me for consideration, and you will also notify the employees of their right, on conscientious grounds, to be fully protected in the observance of the day of rest."

In commenting upon the above our contemporary says: "All railway managers agree that the entire avoidance of work on Sunday is desirable, but it is generally felt that this is impractical. President Young's fearless action, however, has called new attention to the subject and may result in at

least a diminution of Sunday labor. It is difficult to see how a total stoppage of railway operations on that day can be effected, because there are certain mail and suburban trains—the latter carrying many churchgoers and funerals—which will be demanded by the public and which have come to be considered necessities. But that some of the passenger and excursion trains might be taken off without public detriment, and that the running of Sunday freight trains might be entirely abandoned—although this would be a very difficult matter on many lines—there can be no doubt. We also fully believe that the physical and moral condition of railway men would be greatly improved by the recognition of a day of rest in every week. The Louisville, New Albany and Chicago company will doubtless suffer a very considerable loss of revenue, as its Sunday excursion and camp-meeting trains have been very profitable, and its president is certainly entitled to great respect for inviting this loss solely on conscientious grounds. It is strange inconsistency, by the way, that representatives of the Methodist church, which strongly denounces Sabbath labor, give this railway the strongest inducements to run Sunday trains by voting to keep their camp-meeting grounds open on that day, so as to attract visitors from the city. That a railway officer should stand up for Sunday observance in the face of temptation from the churches themselves is certainly remarkable. The subject has many phases, and conclusions ought not to be formed without careful consideration."

LATE PUBLICATIONS.

Mac.—Recent Practice in Marine Engineering. By William H. Mac; to be completed in 12 monthly parts, imperial 4to; 1883. Each, \$1.

This work is intended to give an illustrated account of the leading types of marine engines constructed in the past ten years in this country and in Europe. Besides marine engines, it will also contain descriptions and illustrations of other machinery, such as dredges, engines for cable-towing systems on rivers and canals, &c. Parts I, II and III, now ready.

CONTENTS OF PART III.
Text: 1, Experiments on the Engines of the United States Revenue Steamers Richard Rush, Samuel Dexter and Alexander J. Dallas (with Illustrations in Text); 2, Experiments on the Engine of the United States Revenue Steamer Albert Gallatin (with Illustrations in Text).

Plates: 27, The United States Revenue Steamer Richard Rush; 28, Engines of the United States Revenue Steamer Richard Rush; 29, Details of Engines of the United States Revenue Steamer Richard Rush; 30, United States Revenue Steamers, Propeller and Boiler of the Richard Rush, and Boiler of the Gallatin; 31, Compound Engines of the S. S. Mexican; 32, Compound Engines of the S. S. Mexican; 33, Boilers of the S. S. Mexican; 34, Swiss Engines for Steam Launch; 35, Compound Engines for H. M. S. Coquette; 36, Details of Compound Engines for H. M. S. Coquette; 37, Compound Engines for the Steam Launch Bell Bird; 38, Compound Engines of the S. S. Itata.

Hale, P. M.—The Woods and Timbers of North Carolina. New edition, 270 pages, 12mo, cloth; 1883 \$1.25

This work is a compilation from the botanical and geological reports of Drs. Curtis, Emmons and Kerr, to which are added information obtained from the Census Bureau, and accurate reports from the several counties.

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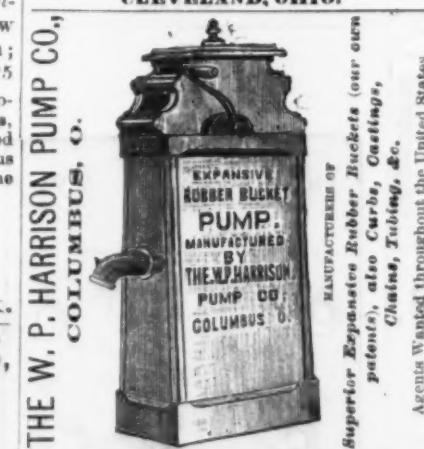
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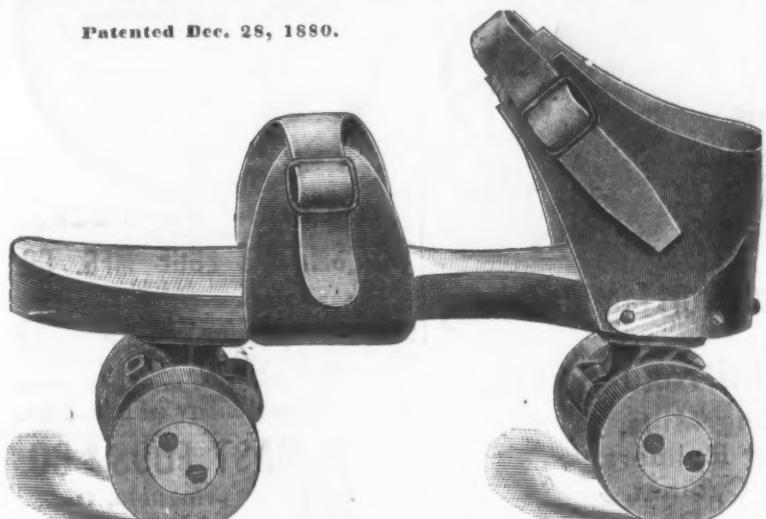
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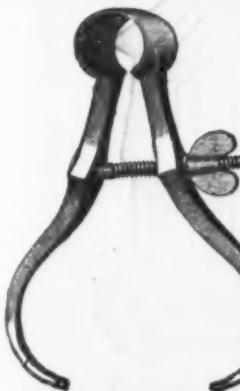


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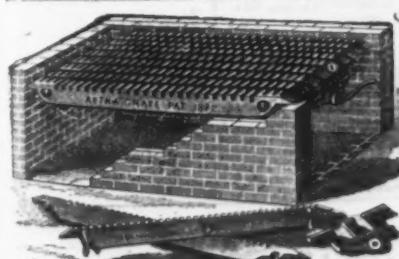
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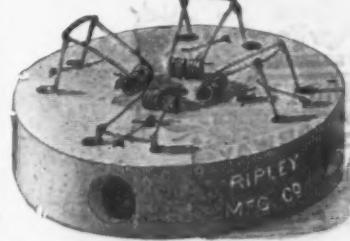
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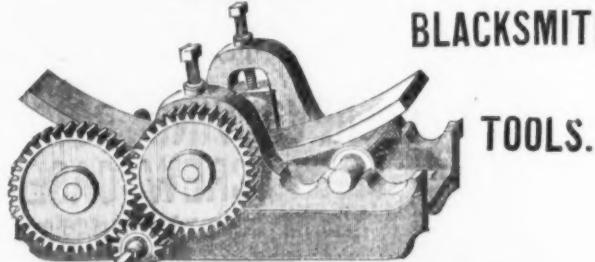
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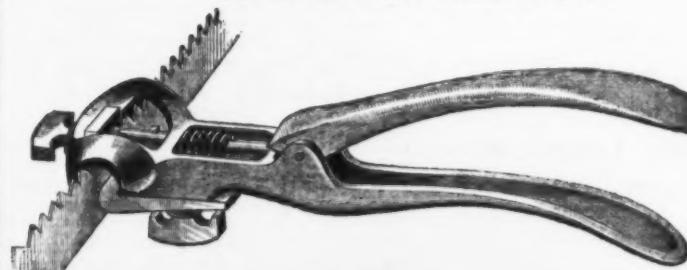
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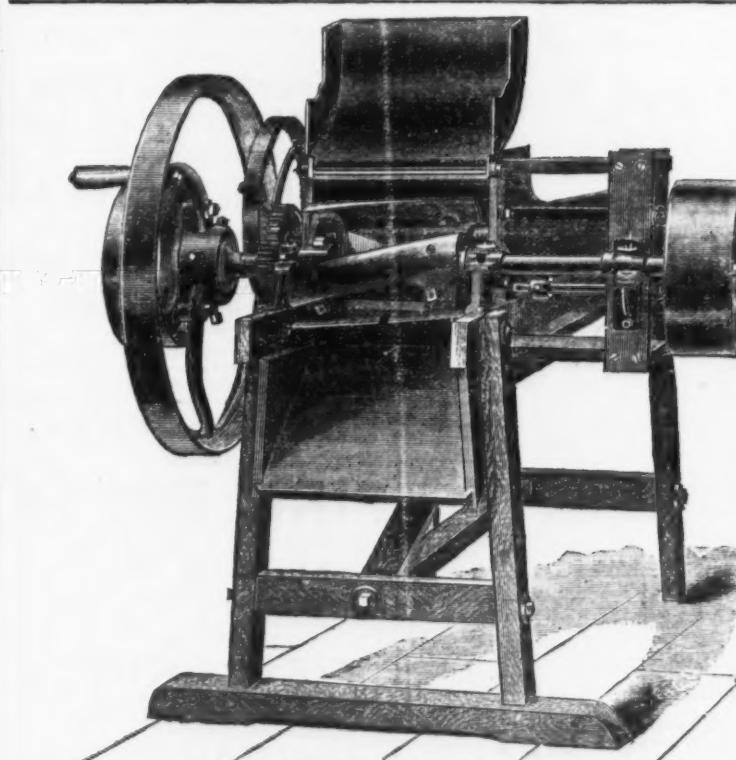
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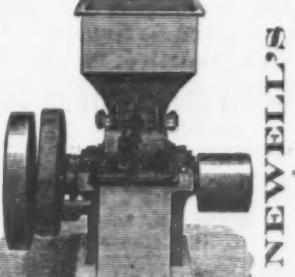


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Clark's, No. 1, \$1.00; No. 2, \$2.00 per gross	Per doz \$1.30
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Hammond's Windows Springs	Per doz \$1.30
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The Perfect, Clark & Smith, N-Plated	Per doz \$1.30 net
"Universal"	Per doz \$1.30
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Sold by weight & lots and over	Per doz \$1.30
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Maws	
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Boynton's Lightning Cross Cut, new list	Per doz \$1.30
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Per doz	100 100 100
Per doz	100 100 100
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With which is incorporated *The Universal Engineer*,is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:

MAY 26, JUNE 23, JULY 21, AUGUST 18, SEPTEMBER 15, OCTOBER 13, NOVEMBER 10, DECEMBER 8, 1883, JANUARY 5, FEBRUARY 1, and MARCH 1, and 20, 1884.

This supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only with reach, but in the native language of eighty millions of *German*, twenty eight millions of *Italian*, and fifty-one millions of *Spanish* speaking people; or, all, over two hundred millions of inhabitants in the principal nations where the buyers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFF.

Size of Page—13 $\frac{1}{2}$ Inches Deep by 9 $\frac{1}{2}$ Inches Wide.

	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.		13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.
One page.....	\$30.00	\$33.75	\$37.50	Quarter page.....	\$10.00	\$11.25	\$12.50
Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	7.50	8.45	9.40
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.20	7.00	7.75
One-third page.....	12.50	14.10	15.05	One-sixteenth page.....	3.20	3.40	4.00

Advertisers will do well to use Illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List of Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.THE RICHARDS HOUSE-DOOR HANGER
FOR SLIDING DOORS.

They are simple to hang, massive and strong, without a single weak point. Adaptable to all widths of doors from two to twelve feet, single or double, and require no track on the floor. The only absolutely anti-friction top hanger in the market. There are no plates to mortise in; no matching of hardware, and no defacing of doors. The trade are required to carry but one size in stock, the run being about forty inches longer than the largest sheave upon the market. Every set guaranteed. Write for quotations.

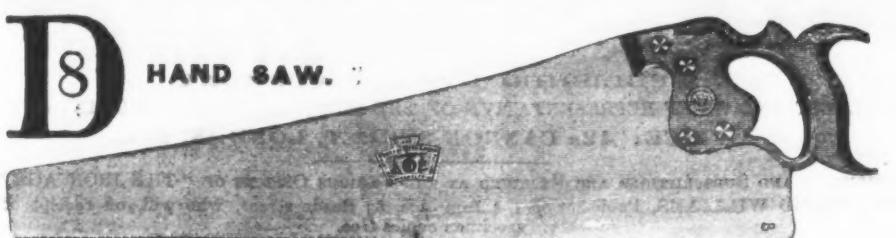
MANUFACTURED BY

WILCOX MFG. COMPANY,
AURORA, ILL.THE LOW PATENT
FEED WATER HEATER & PURIFIER,
FORHeating and Purifying Water for
Steam Boilers.
Patented

HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,
Front and Laurel Streets, PHILADELPHIA.

SKEW-BACK SAWS.



This Saw has all the latest improvements in Hand Saws, and is warranted superior to all others, and is giving entire satisfaction.

We call the attention of the trade to our new styles of
COMMON HAND SAWS,

the *cheapest* in the market. We are also offering

SUPERIOR CROSS-CUT SAWS

FOR THE FALL TRADE.

Send for Price List.

SAUNDERS' PATENT AUTOMATIC BORING MACHINES FOR BUILDERS' AND FRAMERS' USE,

are universally acknowledged to be superior to all other Boring Machines, and we guarantee to give better satisfaction than any other machine.

Ship Builders, House Builders, Dock Builders, Bridge Builders, Carpenters and Framers please notice what we claim for our machine, and we guarantee all that we claim: First, that it will do nearly double the work of any other machine in the same length of time, with greater accuracy; second, that it will regulate the speed of the bit according to the size of the same, or to suit the operator: it will drive the bit any required speed; it will drive the bit or auger to any required depth, and the bit or auger returns from the hole by the same automatic motion without the operator stopping the machine; at the same time clearing itself and leaving the hole entirely free from chips; it is gauged to bore such a depth as may suit the operator, boring two or more holes at exactly the same depth after being once set without any attention from the operator; it is angular matched to any bit or auger; it is the most compact machine: it can be placed in so small a compass as to occupy but little room in a carpenter's tool chest, and while in this compact form it can be carried in the hand with the greatest ease and convenience; it is the most durable machine, from the fact that we use the best materials in its construction, and each part can be duplicated in case of accident by sending directly to us. We finish the ironwork with a baked or heated Japan finish, which enables it to withstand all kinds of weather, the woodwork being rubbed in oil and shellac. They are the cheapest Boring Machines in the market for what they can do. We are introducing the Gladwin Improved Auger in connection with this machine. This auger is the best Boring Machine Auger made, being a self-clearer in gummy or knotty wood. We offer the Borer, boxed and delivered on board cars, for \$6. with full set Gladwin Improved Augers, 18 qrs., \$9; or with extra finished beds, \$6.50, and full set augers, 18 qrs., \$9.50. A discount given for large orders. Send for Descriptive Catalogue.

THE W. B. WELLS MFG. CO., Ashaway, R. I.

LOUDERBACK, GILBERT & CO., 33 Chambers St., New York, Agents. TALLMAN & MCFADDEN, 607 Market street, Philadelphia, Agents. BUHL, SONS & CO., Detroit, Mich., Agents. A. W. BINGHAM & CO., Cleveland, Ohio, Agents. SIMMONS HARDWARE CO., St. Louis, Mo., Agents. GORDON HARDWARE CO., San Francisco, Cal., Agents. HODGE & HOMER, 47 Randolph street, Chicago, Ill., Agents.

WILEY & RUSSELL MFG. CO.,
THE GREEN RIVER TIRE UPSETTER.

Greenfield, Mass.

LIGHTNING

Screw-Cutting Machinery and Tools.

Lightning Screw Plates. Lightning Bolt Cutters. Green River Tire Upsetters. Green River Horse Shoes' Vises. Green River Drills. Green River Tire Binders. Tire Measuring Wheels, &c., &c. Taps and Dies for use in Machines. Screw Plates, Bit Brace, Drilling Machines, &c. Bit Brace Reamers, for Blacksmiths and Carriage Makers.

Send for Illustrated Price List.



WROUGHT IRON TACKLE BLOCKS.

Swivel Hooks for Rope or Chain,
POLISHED GROOVES, ALL SIZES IN STOCK.

Also Pulley Blocks for Wire Rope,

Headquarters for the

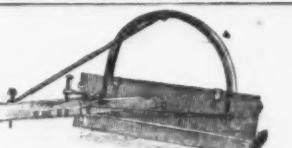
RVING BRAND WOODEN PULLEY BLOCKS,

McCoy & Sanders, Manufacturers,
26 Warren Street, New York.



AGENTS IN ALL FOREIGN COUNTRIES.
HOWSON'S
PATENT
OFFICES
119 South Fourth Street,
PHILADELPHIA
Branch Office, 605 Seventh St., Washington, D. C.
H. HOWSON, Engineer and Solicitor of Patents.
G. HOWSON, Attorney at Law and Counsel in Patent Cases.
SEND FOR DESCRIPTIVE CATALOGUE.

R. D. WOOD & CO.,
Philadelphia,
Manufacturers of
Cast Iron Pipe
FOR WATER AND GAS,
Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants,
400 CHESTNUT STREET.



ONONDAGA PATENTED ROAD SCRAPER.

The BEST and CHEAPEST in the WORLD. We not only guarantee it is a good scraper, but can safely say it has no equal. Price, \$25. Liberal discount to agents. Send for circulars. Address

F. G. AUSTIN,
BOX 293, MANHATTAN, N. Y.

LEVER
Lemon Squeezer,
With perforated strainer. It will squeeze one-third more juice from a lemon than any other; also quicker and more durable than any other.

R. ONDERDONK,
405 GRAND ST., N. Y. CITY.

Best, Cheapest and
Fastest Selling
POTS
On the Market.

Send for discounts.
R. C. PURVIS,
407 CHERRY ST.,
Philadelphia.

MACHINERY FOR
Straightening and Cutting Wire
of all sizes to any length.

Send for Catalogue.
JOHN ADT,
New Haven, Conn., U. S. A.



Prouty's Patent PEERLESS FORCE PUMP.

Has Self-Adjustable Foot Rest.
NEW AUTOMATIC COMPENSATING
PACKING.

It will throw a continuous jet from
FORTY TO SIXTY FEET. A new pattern
jet and spray nozzle is sent with each
pump.

Especial attention is called to the
material and workmanship exhibited
in these pumps.

LIST PRICE, \$8.

THE NEW ENGLAND BUTT CO.
PROVIDENCE, R. I.
NEW YORK OFFICE, 99 Chambers St.



Try One and You will Buy It.

Send for Illustrated Circulars to
MAST, FOOS & CO., Springfield, Ohio.

MORSE TWIST DRILL AND MACHINE CO.

NEW BEDFORD, MASS., Sole Manufacturers of
Morse Patent Straight-Lip Increase Twist Drill,
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,
BIT STOCK DRILLS.

DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL
PRESSSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER
AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS.
DRILL GRINDING MACHINES, TAPER REAMERS, MILLING
CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt.

EDWARD S. TABER, Treas.

Illustration of a Morse twist drill.

PECK'S DROP PRESS

PECK'S DROP LIFTER is the only one which has its parts
cushioned. Being thus cushioned they are the most durable Lifter in
the market.

Can be attached to any drop now in use.

Send for Illustrated Catalogue.

Cor. Lloyd and River Sts.

New Haven, Conn.

MATTHIESSEN & HEGELER ZINC COMPANY,
LA SALLE, ILLINOIS.

MANUFACTURERS OF

Refined Spelter, Sheet Zinc and
Sulphuric Acid.

ALL ORDERS FILLED PROMPTLY.

Armstrong's Improved Adjustable Stock and Dies
FOR PIPE AND BOLTS.



Tapped to the U. S. and Whitworth Standard Gauges. Adjustable to all variations in the size of
fittings. Can be resharpened without drawing the temper by simply grinding them. Possessing practical advantages appreciated by all mechanics. Circular and Price List sent free on application.

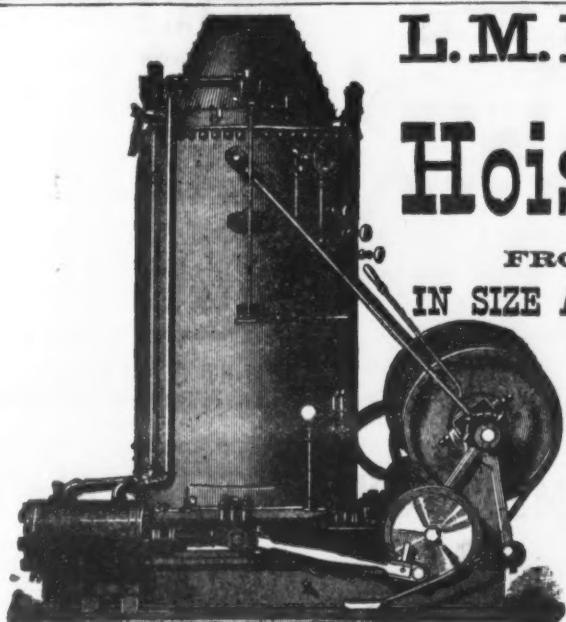
Manufactured by F. ARMSTRONG, 30 Sterling St., Bridgeport, Conn.

PHILADELPHIA.

Corrected Weekly by Lloyd, Supply & Walton.
Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Anvils.
Peter Wrights, 2 D. 11 @ 11¢
Over 200 lbs. 11 @ 11¢
Trenton 10¢
Eagle Anvils, American, 100 11¢ 20¢
Apple Pares.
Globe Apple Pares. \$10.00 net
Pear Apple Pares. \$10.00 net
Lots of 10 to 24 dozen special prices.
Hay State Peach Pares 8¢ 10¢

Axes.
Hunt's Kentucky and Yankee, per doz. \$1.50 @ 6¢
Robert Mann 1.50 @ 8¢
Richards 1.50 @ 8¢
Baldwin Axes 1.50 @ 10¢
Double Bit Axes 1.50 @ 15¢
Augers and Auger Bits.—New List January 1, 1883.
Hates' Nut Augers 1.50 @ 10¢
Cook's Augers 1.50 @ 10¢
Watson's Augers 1.50 @ 10¢
Baldwin Pierce Auger Bits 1.50 @ 10¢
Griswold Auger Bits 1.50 @ 10¢
Cook's Auger 1.50 @ 10¢
Jennings' 1.50 @ 10¢
Baldwin's Pat. Hol. Augers, list \$1.50 per doz. 1.50 @ 10¢
Searns' Pat. Hol. Augers, list \$1.50 per doz. 1.50 @ 10¢
Balances.
Light and Common 1.50 @ 10¢
Bells.
Berlin Bros. Mfg. Co. Light Hand Bells 1.50 @ 10¢
Swiss Pattern Hand Bells 1.50 @ 10¢
Connell's Door Bells 1.50 @ 10¢
G. Western & Kentucky Cow new list 1.50 @ 10¢
Boring Machines.
Upright, without Augers List \$5.00
Angular, without Augers 1.50 @ 10¢
Bolts.—Eastern Carriage Bolts 1.50 @ 10¢ & 10¢
Philadelphia 1.50 @ 10¢ & 10¢
Stanley, Wrought Shutter 1.50 @ 10¢ & 10¢
Bonnet Barber. 1.50 @ 10¢ & 10¢
Hackets 1.50 @ 10¢ & 10¢
Sporforo 1.50 @ 10¢ & 10¢
American Ball 1.50 @ 10¢ & 10¢
Buttins.—Cast Fast Joint, Narrow 1.50 @ 10¢ & 10¢
" " Broad 1.50 @ 10¢ & 10¢
Cast Loose Joint, Narrow 1.50 @ 10¢ & 10¢
" " Broad 1.50 @ 10¢ & 10¢
" " Acorn Loose Pin 1.50 @ 10¢ & 10¢
" " Mayer's Loose Joint 1.50 @ 10¢ & 10¢
Wrought Iron 1.50 @ 10¢ & 10¢
Table Hinges and Back Flaps 1.50 @ 10¢ & 10¢
" " Narrow Fast 1.50 @ 10¢ & 10¢
" " Loose Joint 1.50 @ 10¢ & 10¢
Blind Butts.
Parker 1.50 @ 10¢ & 10¢
Glock 1.50 @ 10¢ & 10¢
Shornd 1.50 @ 10¢ & 10¢
Lulu & Porter 1.50 @ 10¢ & 10¢
Huffer's 1.50 @ 10¢ & 10¢
Chains.—German Hanger and Coll. list December 1, 1882. 1.50 @ 10¢ & 10¢
Galvanized Pump 1.50 @ 10¢ & 10¢
Best Proof Coil Chain—English 1.50 @ 10¢ & 10¢
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Chisels.—Socquet Framing 1.50 @ 10¢ & 10¢
Socquet Framer 1.50 @ 10¢ & 10¢
Butcher's 1.50 @ 10¢ & 10¢
Casters.—Bed (new list July 1, 1883). 1.50 @ 10¢ & 10¢
Plate 1.50 @ 10¢ & 10¢
Coffee Mills—Box and Side, new list Jan. 1, 1883. 1.50 @ 10¢ & 10¢
Eating Utensils 1.50 @ 10¢ & 10¢
Cutlery—Walton Pocket 1.50 @ 10¢ & 10¢
Penn. Knife Co. 1.50 @ 10¢ & 10¢
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' offices net. 1.50 @ 10¢ & 10¢
Drawing Knives.
Hart Mfg. Co.'s 1.50 @ 10¢ & 10¢
Adjustable Handle 1.50 @ 10¢ & 10¢
Fry Pans.
Tinned 1.50 @ 10¢ & 10¢
No. 0 1.50 @ 10¢ & 10¢
No. 1 1.50 @ 10¢ & 10¢
No. 2 1.50 @ 10¢ & 10¢
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No. 7 1.50 @ 10¢ & 10¢
No. 8 1.50 @ 10¢ & 10¢
Furniture.
Nicholson 1.50 @ 10¢ & 10¢
Diasian 1.50 @ 10¢ & 10¢
Butcher 1.50 @ 10¢ & 10¢
Fishing Machines.
Eagle—36 in. roll 1.50 @ 10¢ & 10¢
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Grown—36 in. roll 1.50 @ 10¢ & 10¢
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Genove Fluter 1.50 @ 10¢ & 10¢
Fischer, Fluter & Sad Iron 1.50 @ 10¢ & 10¢
Hammers.
Yorke & Plumb's, new list. 1.50 @ 10¢ & 10¢
Maydole Hammers 1.50 @ 10¢ & 10¢
Howell A. E. Nau Hammers 1.50 @ 10¢ & 10¢
Hinges.
Baldon Loop Handles Crosscut 1.50 @ 10¢ & 10¢
Baldon Loop Handles Crosscut 1.50 @ 10¢ & 10¢
Hatches.
Hunk 1.50 @ 10¢ & 10¢
Hinges.
Strap and T. 1.50 @ 10¢ & 10¢
Globe Nail 1.50 @ 10¢ & 10¢
Vulcan 1.50 @ 10¢ & 10¢
Ausable 1.50 @ 10¢ & 10¢
" Polished and T'd. 1.50 @ 10¢ & 10¢
" Glued & T'd. 1.50 @ 10¢ & 10¢
Clinton 1.50 @ 10¢ & 10¢
" Polished & Pointed. 1.50 @ 10¢ & 10¢
Hay and Straw Knives.—per doz. net \$1.00
Lightning 1.50 @ 10¢ & 10¢
Bale 1.50 @ 10¢ & 10¢
Wadsworth 1.50 @ 10¢ & 10¢
Walton Straw Knives 1.50 @ 10¢ & 10¢
Locks and Keys.
Locks and K. new list 1.50 @ 10¢ & 10¢
Gavford Cabinet 1.50 @ 10¢ & 10¢
American Padlocks 1.50 @ 10¢ & 10¢
Scandinavian Padlocks 1.50 @ 10¢ & 10¢
No. 10 1.50 @ 10¢ & 10¢
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L. M. RUMSEY MFG. CO.
ST. LOUIS, MO.

Hoisting Engines

FROM 4 TO 50 HORSE POWER,
IN SIZE AND STYLE TO SUIT REQUIREMENTS.

SPECIAL COAL-HOISTING ENGINES
DOUBLE-CYLINDER MINING ENGINES,

ENGINES AND BOILERS

Pumping Machinery,
MINING AND ENGINEERS' SUPPLIES.

AMERICAN BOLT CO., Lowell, Mass.,
MANUFACTURERS OF
Bolts, Nuts, Washers, Chain Links, Car
Bolts, Bridge Bolts, Lag Screws, &c.

LOWE'S METALLIC PAINT CO.,
CHATTANOOGA, TENN.

OFFER TO CONSUMERS

THE BEST METALLIC PAINT MANUFACTURED IN THE UNITED STATES



We have OVER 1000 CERTIFICATES from Railroad Officers, Wagon and Agricultural Implement Makers, Car Builders, Tin and Sheet Iron Roofers, Wrought Iron Bridge Companies and Blast Furnaces. We guarantee IT TAKES 2.5 PER CENT. LESS OIL, has more body and better covering properties than any other metallic paint.

For sale by the principal paint dealers and hardware merchants in the United States.

MONTGOMERY & CO.,
IMPORTERS

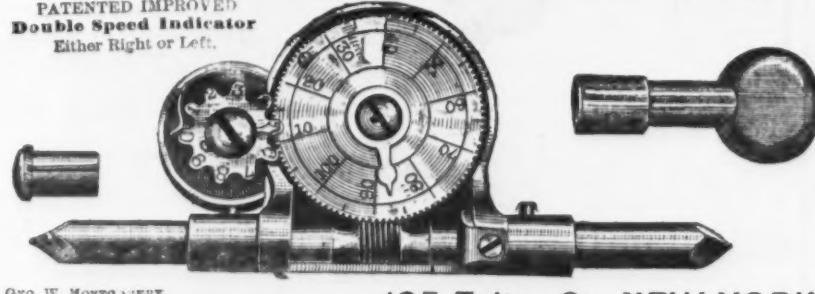
Stubs' Files, Tools and Steel, Grobet Swiss Files,
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Hubert's French Emery Paper, Horseshoe Magnets, &c.
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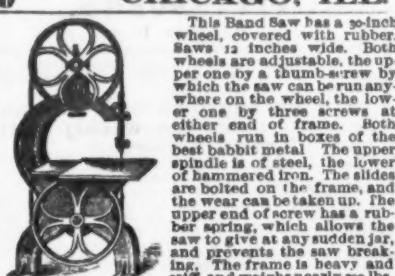
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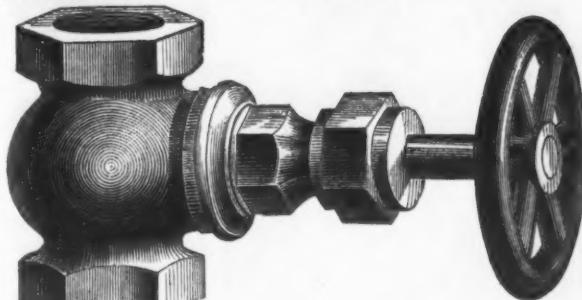
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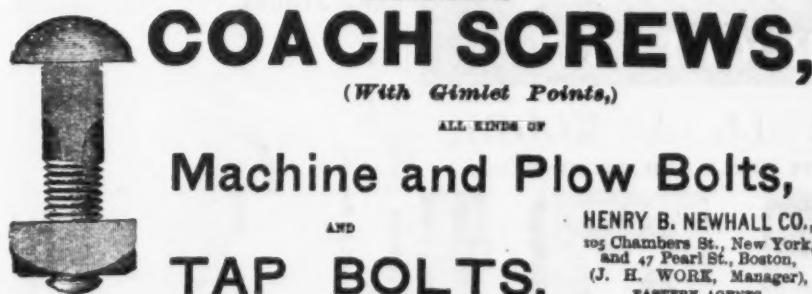
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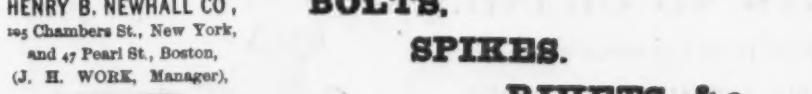
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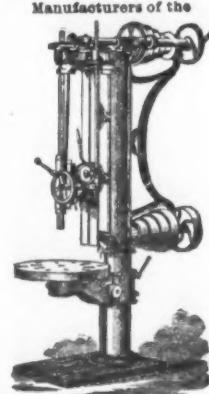
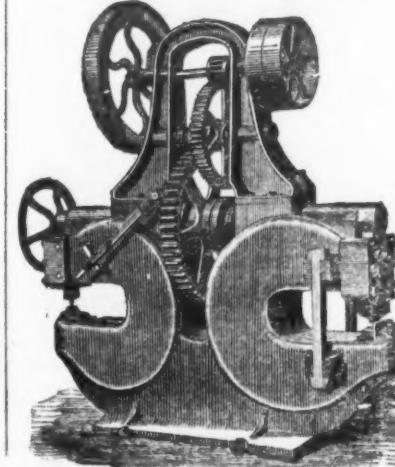
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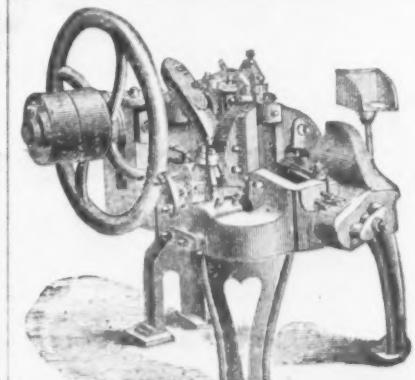
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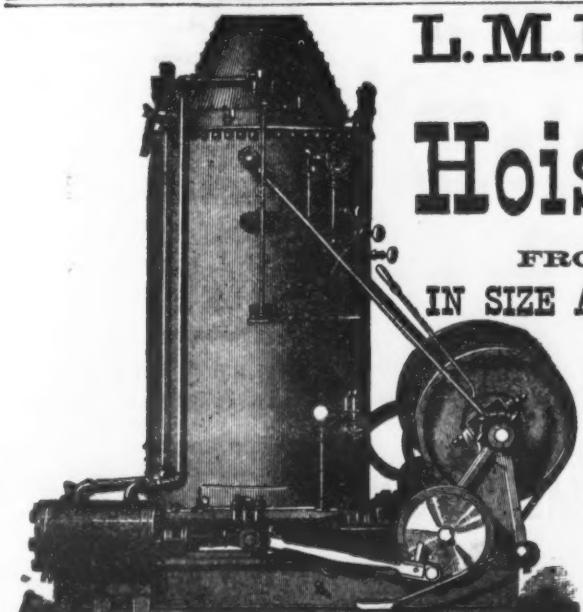
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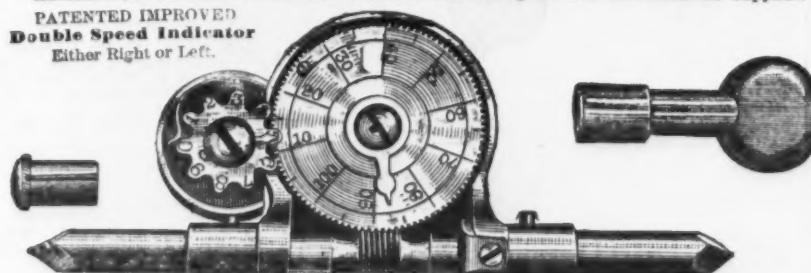
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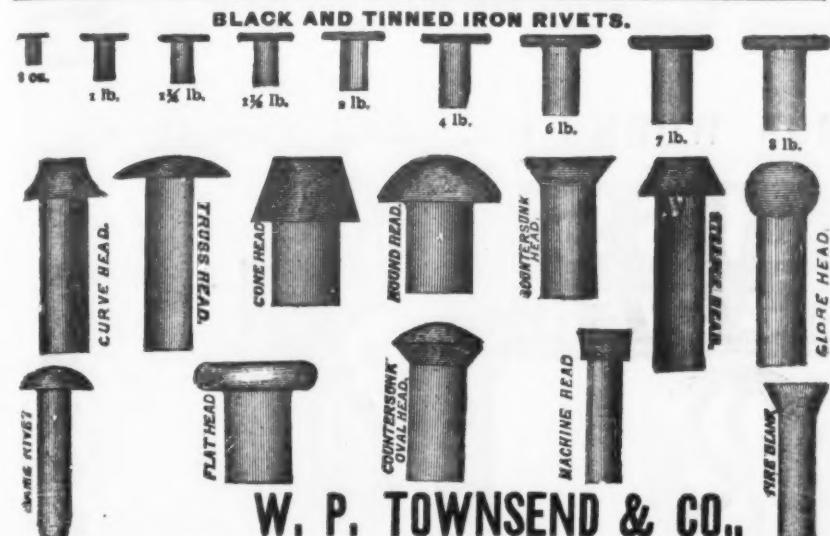
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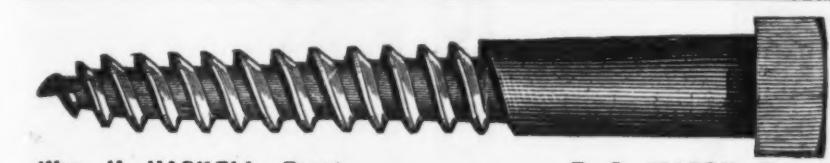
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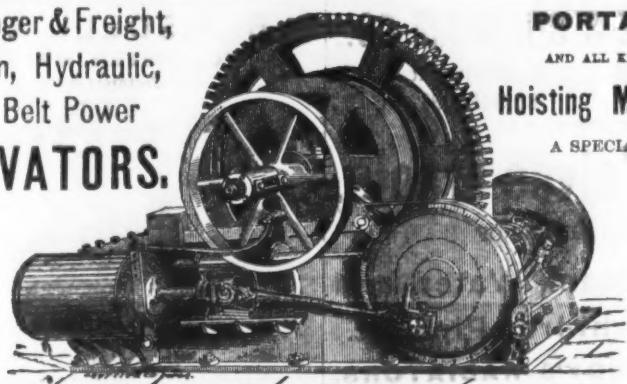
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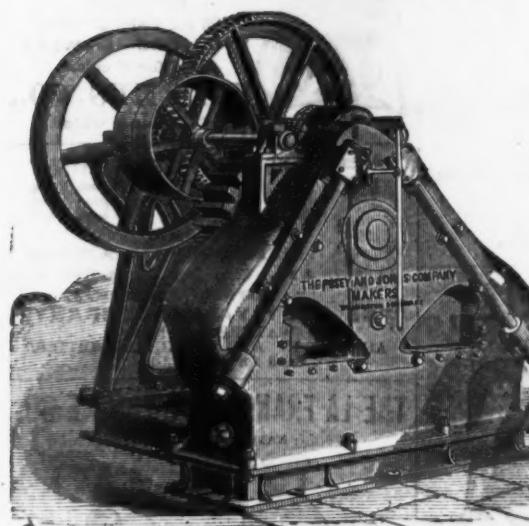
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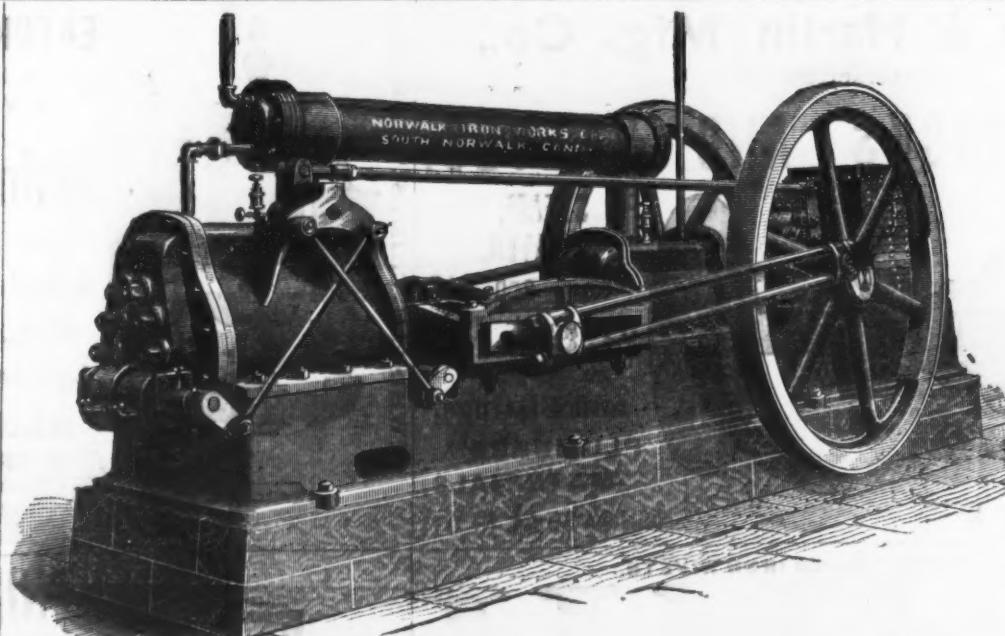
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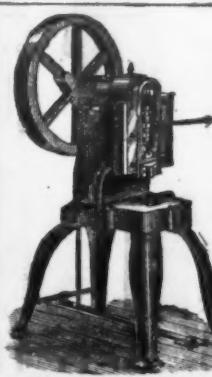
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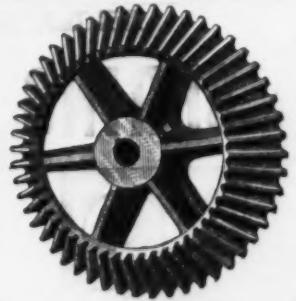
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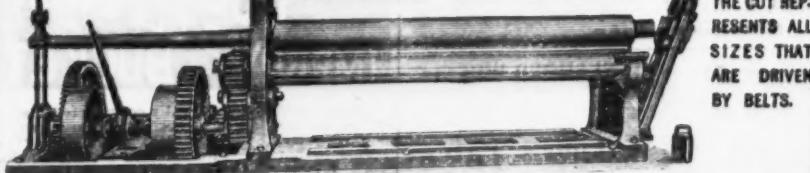
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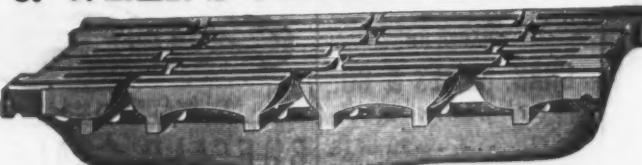
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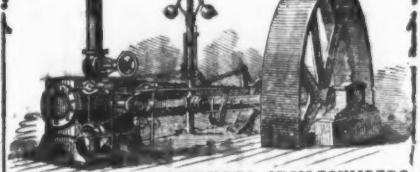
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